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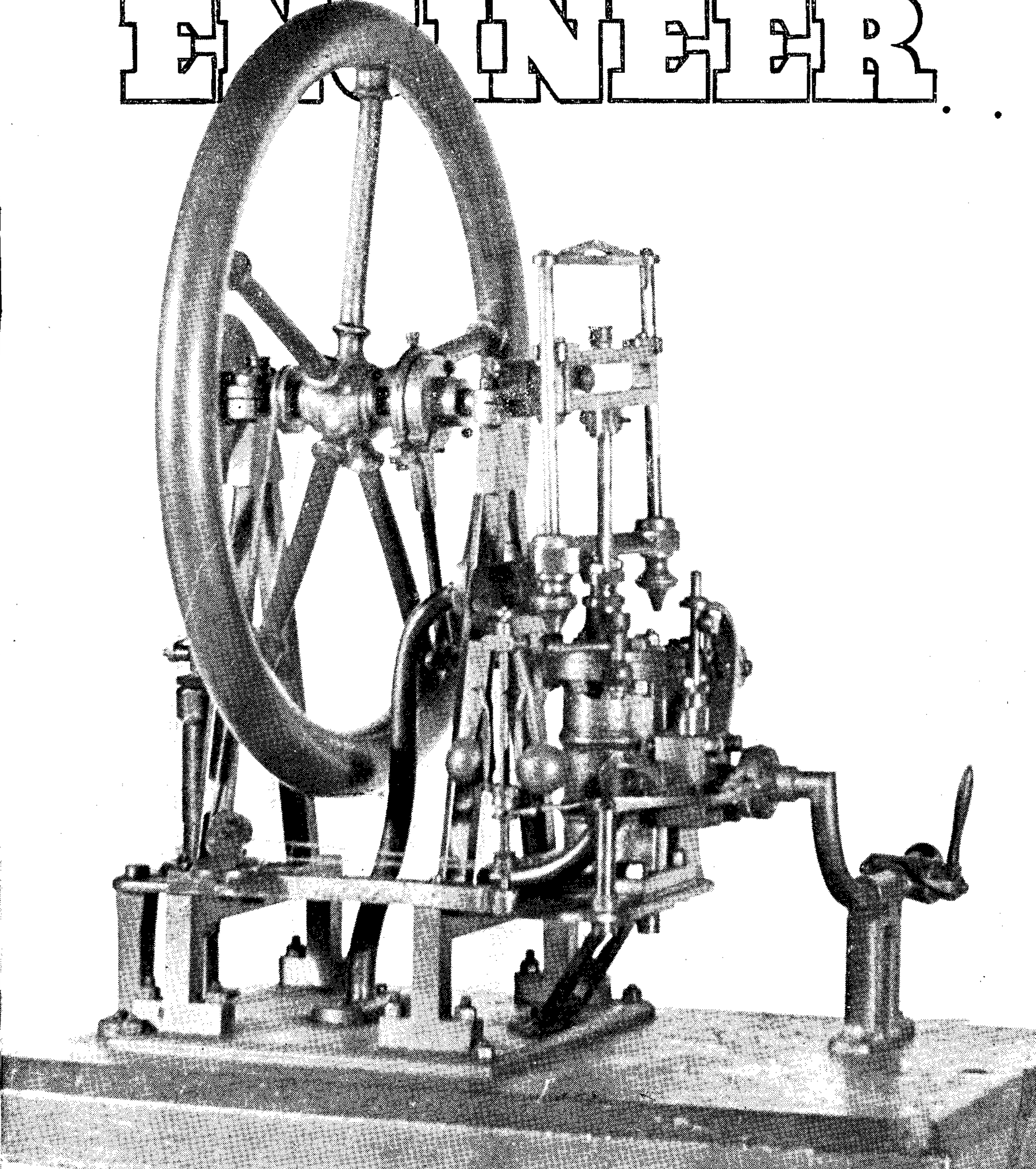
THE MODEL ENGINEER



The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

9TH AUGUST 1951 • VOL. 105 NO. 2620

SMOKE RINGS

Our Cover Picture

● THE MODEL illustrated on the cover this week is one of those things which, for the time being, are "wropt in mystery." It was presented to the Staines and District Society of Model Engineers, in memory of the late Len Wilson, who was a valued and respected member; but nothing whatever is known of its origin, who built it, or when it was built.

The flywheel is 10½ in. diameter, but there are no available details of the cylinder bore and stroke or any of the internal details, because, up to the present, the members have preferred to keep the model in its original condition. Perhaps, some "M.E." reader may be able to recognise the model and give some details of its history and purpose; if so, we would be glad to forward the information to the society.

The "Britannias"

● THE VERY numerous locomotive enthusiasts among our readers take a keen interest in the trends of full-size practice; proof of this is forthcoming in the fact that, as a result of the publication of Mr. C. M. Keiller's letter in THE MODEL ENGINEER for May 24th, and one or two others since, we have received a very large number, including some from enginemen and firemen, which express various opinions favouring and disfavouring *Britannia* and her sisters.

To find space for all these letters is, in present conditions, impossible; even if we had the space to spare, we do not think that THE MODEL ENGINEER is the proper magazine in which to publish them. Several contemporary journals cater especially for full-size railway matters, and it is not part of our policy to compete with them. All that we can do is to thank those many readers who have written and to express our regret that we are obliged to decline to pursue the matter further.

As to the features of the design of *Britannia*, and the factors which led up to it, the designer, Mr. E. S. Cox, has made the matter quite clear, we think, in his paper on "B.R. Standard Locomotives" given to the Institution of Locomotive Engineers last year and since reviewed in various "railway" periodicals and technical journals.

Meanwhile, *Britannia* and several of her sisters are at work on the Eastern, Midland and Southern Regions so that the engines may be tested in as wide a variety of conditions as possible against the best of the pre-nationalisation types on the same class of work. Only in this way can conclusive information be obtained as to the success of the design.

Some Pull

● READERS WILL remember the description of "A Traction Engine and its Habits" in our issue for March 29th last, in which Mr. E. J. Baughen, of the Malden and District Society of Model Engineers gave an entertaining account of experiences he had had with his 2-in. scale traction engine.

Mr. Baughen has recently written to express satisfaction that his appeal for traction engines in steam at the "M.E." Exhibition is being answered; of course, he will be there with his engine. He adds, however, that since his article was published, the engine has added to her reputation by being filmed for Pathé News, and succeeded in pulling a 16-h.p. Wolseley car. We understand that the weight of the car was 26 cwt., and we think that this ought to allay any doubts in the minds of those readers who frequently write to ask us if we can say whether a miniature traction engine will be able to haul a couple of children plus the driver! We have seen even a ¾-in. scale engine do that easily, when working on 100 lb. p.s.i. boiler pressure and running on drugget laid on the floor.

Science Museum Photographs

● IN COMMENTING on our cover picture for the issue of July 26th we omitted to mention that it was reproduced, by permission of R. C. Anderson, from a Science Museum photograph. The model is the property of Mr. Anderson and is at present on loan to The National Maritime Museum. The Science Museum photographs are highly prized by the experienced ship modeller, as they are of such perfect quality and such a useful size (approximately 11 in. by 9 in.) that they are almost as informative as seeing the actual model. Several different photographs are available for each of the principal models. At their price of 2s. each, a set can be purchased for the cost of a visit to the museum: this is especially the case with the provincial ship modellers. Full particulars concerning the photographs can be obtained from The Director and Secretary, The Science Museum, South Kensington, London, S.W.7.

Hale and Hearty Veterans

● SOME READERS, seeing our recent note about the preservation of Western Region engine No. 4003, *Lode Star*, and especially our statement that this engine and the contemporary No. 4007, *Swallowfield Park*, are still in service, have written to question the wisdom of retaining engines which are now some 44 years old on the "active" list. There seems to be a widespread impression that it is this kind of thing which is primarily the cause of engine failures in traffic.

We disagree with the idea, simply because, if space permitted, we could produce plenty of evidence to show that by far the greater number of failures occur to more modern types; in fact, even the very latest locomotives are by no means guiltless!

But we would make it clear that locomotive failures are not as common as some of our readers appear to imagine; nor can it be said that, when they do occur, they are more frequent on any one road.

However, the two old Western Region engines we have mentioned certainly do not appear to be in any danger of "falling by the wayside." No. 4003, *Lode Star*, is stationed at Landore (Swansea) and occasionally comes to London. As recently as May 5th, we saw this engine pass Maidenhead, at something over 60 m.p.h. at the head of the 11.35 a.m. South Wales express, which is timed to cover the 133½ miles non-stop to Newport in 2½ hours. On April 11th, No. 4007, *Swallowfield Park*, surprised us as she speeded through Reading on the 11.35 a.m. Paddington-Worcester train, which stops at Oxford, Kingham and Evesham only.

We have made enquiries and we have been officially informed that, in both cases, the engines timed the trains punctually throughout; moreover, we are also informed that both engines have worked the same turns more than once since the dates on which we saw them. This does not suggest that either engine has become decrepit, in spite of 44 years of service! They are as hale and hearty today as they have ever been, and they have long outlasted all their contemporaries on top-link main line passenger work, thereby proving, in unmistakeable fashion, not only the genius of G. J. Churchward, but the wisdom of retaining them on the active—*very* active—list.

Calling North Wales

● BRIGADIER D. J. R. RICHARDS, Cwymp Hill, Llanddulas, North Wales, is anxious to form a model engineering society in that area, to cover Abergele, Old Colwyn, Colwyn Bay and Rhos-on-Sea. There does not appear to be such a club in the district, and Brigadier Richards seems to regard this as strange, in view of the very strong showing that our hobby can put up in South Wales. Any reader interested in the scheme for North Wales is invited to get into touch with Brigadier Richards at the address given above.

New Picture-stamps

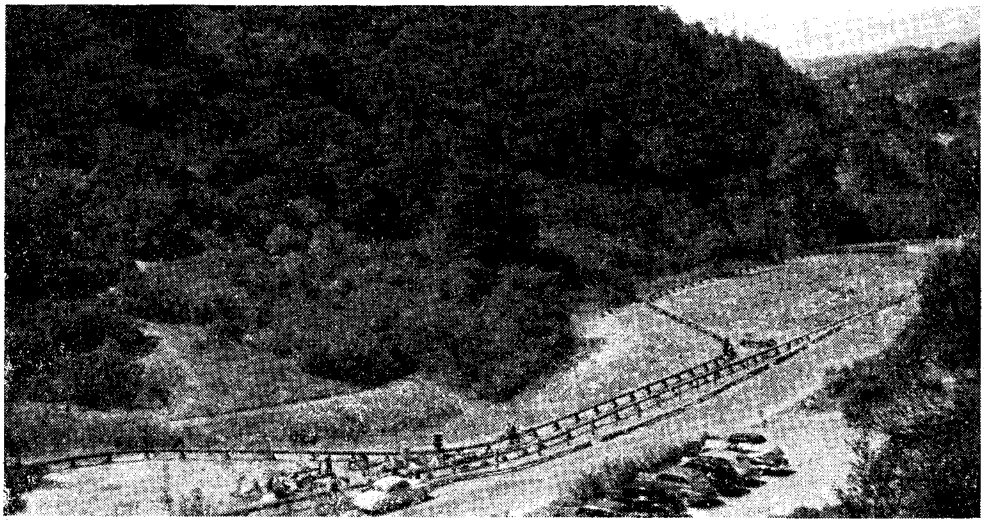
● SOMETHING TO interest the younger members of the family, while helping to augment the funds of the Hospital of St. John and St. Elizabeth, is to be found in a new scheme for collecting picture-stamps. These are nicely printed in photogravure and are made up into perforated series of six, five sets of each series being made up into a book obtainable at 2d. per stamp.

Children love to collect things, and when the collection helps to stimulate observation and increase interest in well-known objects and people, the habit is to be encouraged.

Each of these new picture-stamps is 1¾ in. by 1½ in. and has a gummed back to facilitate sticking into albums. The subjects include ships, aeroplanes, railway trains, sportsmen, palaces and cathedrals; many others will be added as the scheme progresses. Schools can use these stamps for "Credit" stamps and can obtain them, at reduced rate, from the Director of Appeals, Hospital of St. John and St. Elizabeth, 34, Circus Road, London, N.W.8.

THE GOLDEN GATE LIVE STEAMERS' TRACK

by Victor T. Shattock



A general view of the Golden Gate Live Steamers' track, Redwood Park, Oakland, California

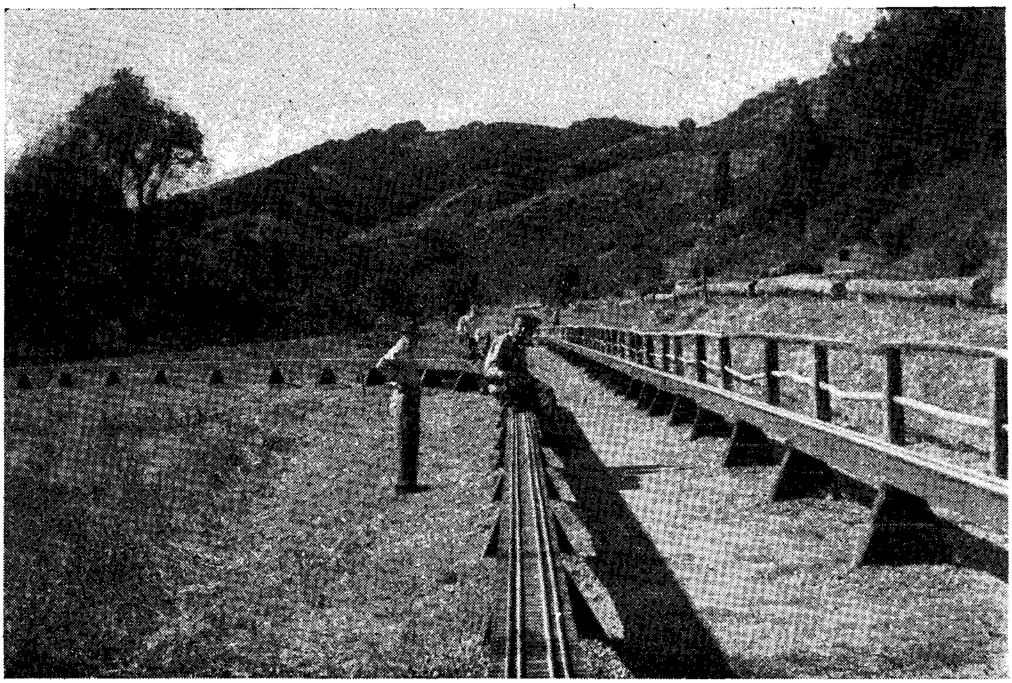
[*Editorial Note.* In our issue for December 7th last, we published a "Smoke Ring" briefly describing the fine track built by the Golden Gate Live Steamers Inc., at Oakland, California, U.S.A. We have now received from Mr. V. T. Shattock, the President of the Golden Gate Live Steamers, some excellent photographs and a further description of the track. We leave this material, which is published below, to speak for itself. We would merely remark that we think that, not only the track, but also its scenic setting are more than likely to excite the envy of some of our readers.—Ed., "M.E."]

THE Golden Gate Live Steamers organisation was formed early in 1939 by a few enthusiastic followers of the hobby, but it was not until 1940 that actual passenger-hauling by $2\frac{1}{2}$-in. gauge engines was demonstrated publicly in this part of the country, and then only on temporary tracks in public buildings. During 1948, permission was obtained to erect a track in one of the public parks and after three years of spare-time labour a continuous multi-gauge track, 1,330 ft. long, which accommodates $2\frac{1}{2}$-in., $3\frac{1}{2}$-in. and $4\frac{3}{4}$-in. gauge locomotives, was built.

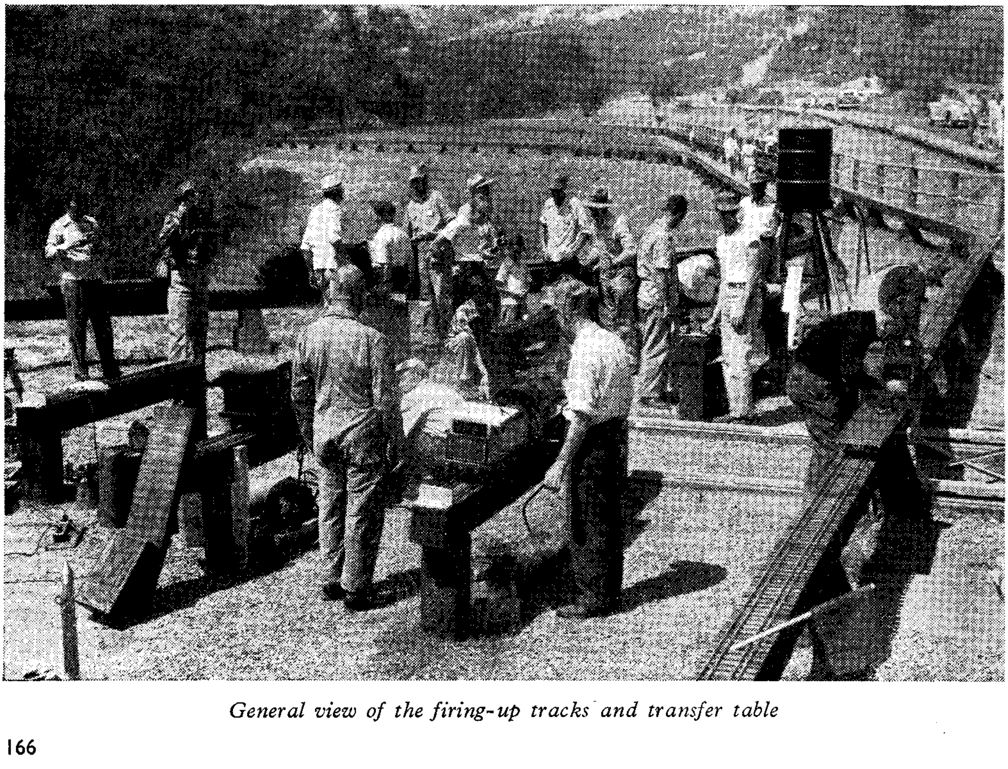
The roadbed consists of discarded ties (sleepers to you), which carried standard size locomotives and trains over trestle bridges. These ties, which are about 9 ft. long, rest on piers also cut from heavy bridge timbers and which sit on a bed of crushed rock or gravel.

The cross ties, or sleepers, were cut to suit the largest gauge, $4\frac{3}{4}$-in., or 1 in. to 1 ft. scale. The rail is of duralumin, and is of an "inverted T" pattern; it is fastened to the ties by drilling holes through the base of the rail and nailing with screw nails. Fish plates of galvanised sheet iron were formed for use at each rail joint. The question may arise as to why we did not use small spikes for fastening the rail to the ties in the same way as is the practice on big railroads in this country. To this I would reply that this method cuts down rail creeping caused by various temperatures. The standard railroads use anti-rail creeping devices which would not be practical for our purposes. The nailing of the rail through the base does not weaken the rail we are using, and the method has proved satisfactory in holding the track in line. The use of screw nails prevents the loosening and raising that would occur if straight nails were used.

The track takes the form of a figure "9" and it was intended to make two complete loops. The maximum radius of curves is 80 ft. and the minimum 30 ft. A transfer table about $6\frac{1}{2}$ ft. long to facilitate moving engines to and from firing-up tracks and the main line, is fitted at a convenient spot in the small loop beside which water and electric power is provided for "firing-up" purposes. Plans are under way for a shelter to be erected over the firing-up tracks, also for "take-off" tracks to be installed for the convenience of those who are unfortunate enough to have engine failures. Such take-off tracks will



The general layout and construction of track



General view of the firing-up tracks and transfer table

enable the driver to remove his engine and look it over and perhaps fix it without getting in the way of others who wish to be steaming along.

Another item I would like to include in this letter. Last September following the opening of our track we received a telegram of congratulations from the Birmingham Society of Model Engineers, signed Campbell, social secretary. The telegram said a letter would follow. I have been wanting to acknowledge this telegram and thank the Birmingham Society and Mr. Campbell in particular for his kind thoughts for us so far away, but I have not received a letter or anything which would give me the address so that I could take care of the matter. Would you be kind enough to let me know where I can reach this gentleman and I will make up for what may seem to him a lacking courtesy.

It was through the sympathetic interest on the part of the officials of the Southern Pacific, Mr. E. D. Moody, assistant general manager plus the directors of the East Bay Regional Parks Board, that we were able to build a track for live steamers in Oakland. The Park Board graded the right of way and Southern Pacific furnished the ties and timber as well as transportation of material to the site which latter, in itself, was no small item.

The track was officially opened on September 2nd, 1950. The golden spike, formally completing the loop, was driven by Mr. E. D. Moody, assistant general manager, Southern Pacific Company, and Mr. John MacDonald, director of the East Bay Regional Park District. The ribbon stretched across the track was cut by Mrs. Irene Evans, daughter of President Vic Shattock of the G.G.L.S., thereby removing the only barrier to the dozen steam locomotives lined up ready to pass the reviewing stand. The parade was led by Jim Keith's 1-in. scale 4-6-4 with Jim's son, Sid, at the throttle, followed by members of the Southern California Live Steamers and the San Diego Live Steamers, with one or two engines from the home gang.

Mr. E. D. Moody, assistant general manager, Southern Pacific Company, pulls the throttle on Vic Shattock's 2½-in. gauge 2-8-2 Southern Pacific "Mikado"

It should be mentioned that John Matthew's *Rocket* was not placed under steam, but in order that everyone present might have an opportunity to observe the wonderful work in this little model it was towed round the track layout back of the Southern Pacific 2-8-2, with John riding on the car ahead.

The big engines of Jim Keith and Gordon Corwin really got a workout over the three days of the meet ; kept their engines going most of the time. They had no failures and are to be con-

(*Continued on page* 177)

A DRILLING AND MILLING SPINDLE

by A. Smith

THE engineers' lathe is rightly recognised as the most versatile of machine tools, and intelligent users find ways and means of adapting it to perform a multitude of operations not originally apparent.

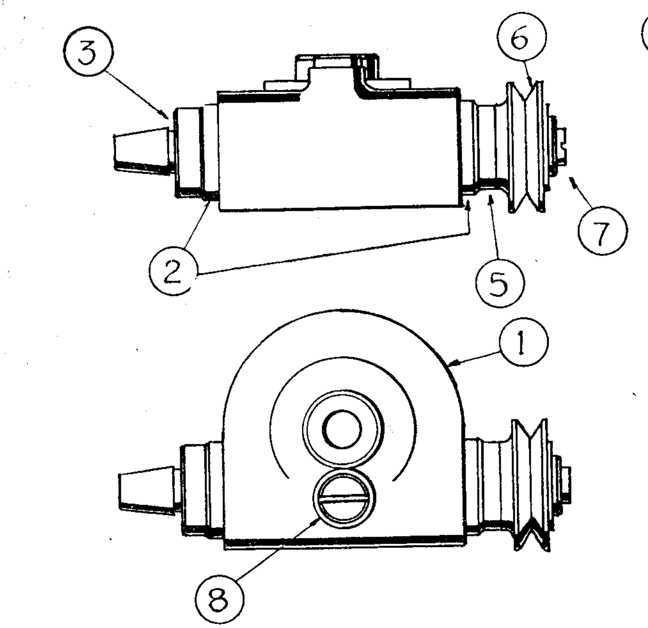
Occasions frequently arise where it is convenient to hold the work in the chuck, faceplate, or between centres, and operate upon it with a rotary tool, drill or end-mill, mounted in an auxiliary spindle carried on the top-slide or vertical slide.

The spindle to be described has been designed to fit the top-slide of the M.L.7 lathe which forms the main machine tool in the writer's workshop. The casting available has, however, enough machining allowance to permit modification to suit alternative lathes.

The general arrangement shows that the spindle is offset to allow clamping by the stud normally employed to clamp the tool.

The body, which is sand cast in aluminium alloy DTD 424, is set up in the lathe four-jaw and the bottom accurately faced, finishing with a fine cut at a high speed to give a high finish. No cutting lubricant is normally required when machining light alloys, although a flow of paraffin will materially assist in reducing the build up of swarf on the tool tip.

The casting is then reversed in the chuck and set up with the large boss rotating truly. Centre deeply and open out until $\frac{7}{16}$ in. diameter is reached, then face the remaining surface of the boss. By forming the hole first it means that in the subsequent facing of the boss the lathe tool has less of the outer skin of the casting (which may be sandy) to penetrate.



Part list

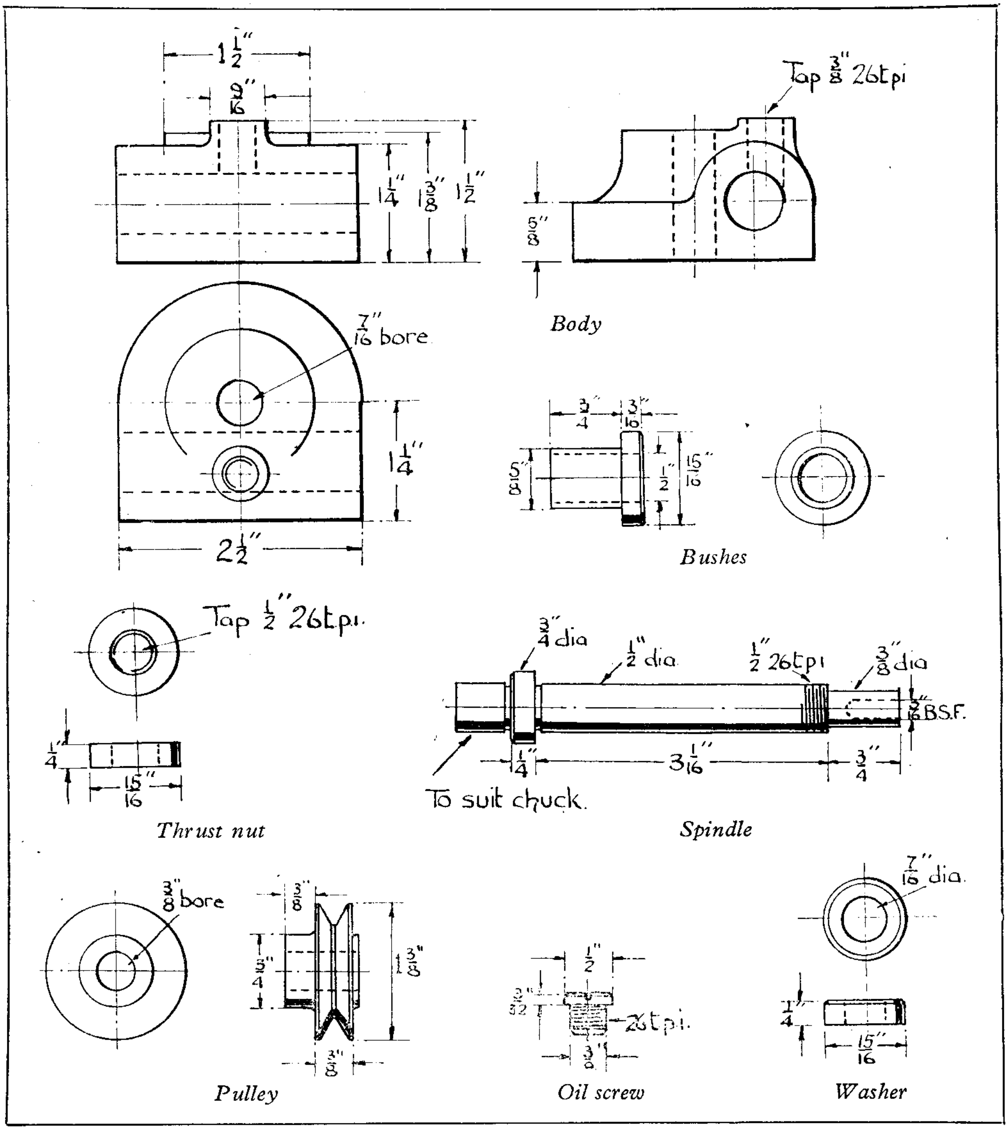
1. *Body.*
2. *Bearings.*
3. *Spindle.*
4. *Washer.*
5. *Adjusting nut.*
6. *Pulley.*
7. *Locking screw and washer.*
8. *Oiling screw and washer*

Reset the casting so that the oiling boss now revolves centrally, centre, and face remainder of boss.

As the body is of a comparatively soft material, it is advisable to make a washer to withstand the friction of the clamping-nut. This is a simple piece of lathe work and made from a short length of $\frac{13}{16}$ in. diameter mild-steel.

The body may now be clamped in position on the top-slide and the $\frac{5}{8}$ in. diameter hole bored out by drilling from the headstock. This will ensure that the axis of the bore is on the lathe axis.

Bearing bushes are best made from bronze or gunmetal and should be completely machined in one setting in the lathe chuck to ensure that the bore is concentric with the outside. The bore may have a reamed finish (as on the writer's) or if a $\frac{1}{2}$-in. reamer is not available it may be bored out, using a short length of $\frac{1}{2}$ in. silver-steel as a plug gauge. If the $\frac{5}{8}$ in. hole in the body has been reamed, the outside of the bushes should be turned to 0.001 in. in excess of the reamer, if drilled, the bush may have a $\frac{1}{8}$ in. portion of its



Body

Bushes

Thrust nut

Spindle

Pulley

Oil screw

Washer

length turned to a push fit in the $\frac{5}{8}$ in. hole and the rest turned to the diameter obtained by withdrawing the top-slide 0.0005 in., in each case giving an interference fit of 0.001 in. The bushes are then pressed in, using the vice as a press.

Transfer the casting to the drilling machine and open out the oiling boss with a $\frac{5}{16}$-in. drill, and tap $\frac{3}{8}$ in. by 26 t.p.i. As this boss is offset from the main bore, be careful when the drill breaks through into the spindle bore, as the uneven cutting may cause the drill to snatch at the work.

The spindle may be machined from mild-steel, although if an odd piece of nickel-steel is available, it will have better wearing properties. The spindle nose is shown plain, as its final shape will depend on the chuck employed, which should be of $\frac{1}{4}$ in. capacity. A slight undercut behind the spindle shoulder is advisable to minimise the risk of the spindle riding on the corner.

The drilling and tapping of the $\frac{3}{16}$ in. B.S.F. or 2 B.A. hole is the final operation performed on the spindle. For this it should be accurately set up in the four-jaw chuck.

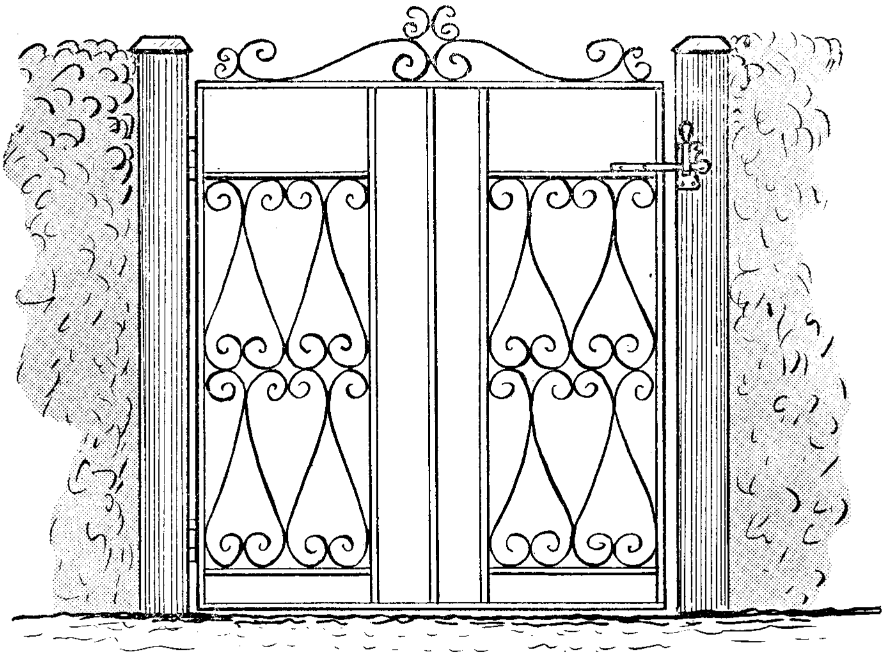
In machining the spindle, aim for a perfect surface and fit where the spindle runs in the bearings, as there is no possibility of taking-up any slack which may appear at these points.

The thrust nut must be machined at one setting

(*Continued on page* 172)

How to Make an Artistic Garden Gate

by J. W. Tomlinson



BENT-IRON work in the past was a job for the craftsman, and many a fine piece of work executed years ago is preserved as an object of artistic beauty. In these days of wood scarcity, bent-iron work has again become very popular; one has only to look round to see the increasing number of iron gates in use today to realise this.

Now a modern garden gate in bent-iron is rather an expensive feature these days, but there is no reason why the home mechanic should be without one, for the making of a gate of this description should offer no difficulties to the average handyman, provided the job is tackled in the right way.

The size of the gate and the amount of artistic work that goes into it will, of course, depend on the requirements of the individual. The size of the gate will also govern the thickness and width of the material used. Whether the gate is to be large or small, the methods described in this article will be the same. The gate chosen as a pattern is one of medium size, such as is used for the ordinary modern villa.

Materials Required

Frame :

1 in. by $\frac{1}{4}$ in. flat-iron—5 lengths at 36 in.
,, ,, ,, ,, —2 ,, ,, 30 in.
,, ,, ,, ,, —4 ,, ,, 12½ in.

Scrolls :

1 in. by $\frac{1}{8}$ in. flat-iron—18 lengths at 27 in.
,, ,, ,, ,, —4 ,, ,, 10 in.

$\frac{1}{2}$ in. angle iron, 1 length of 3 in. for latch bracket.

Iron rivets 42 off, $\frac{3}{4}$ in. by $\frac{1}{8}$ in. for frame to scroll, etc.

Iron rivets 32 off, $\frac{5}{8}$ in. by $\frac{1}{8}$ in. for scroll to scroll.

One pair of butt-type hinges with rivets or bolts.

NOTE.—If the frame is welded together, the lengths of 1 in. by $\frac{1}{4}$ in. will be shorter because of the butt jointing.

Three Methods

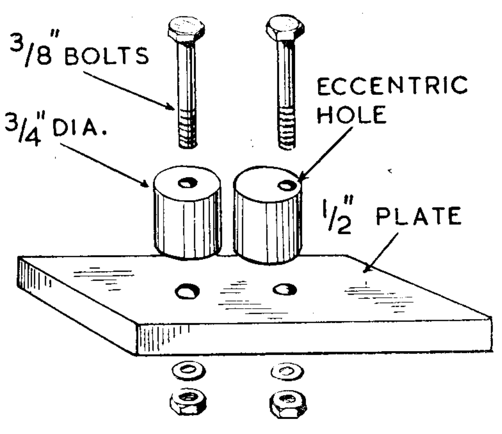
There are three methods of construction, namely all-welded method, all-riveted method, or the frame welded and the scrolls riveted. Which method is used will depend upon the facilities available. Since the majority of readers will not have access to a welding plant, the all riveting method has been fully described. If the gate is all welded, the construction will be very much simplified and a lot of drilling work will be eliminated.

The flat-iron can be bought from any good ironmongers in the larger towns, and sometimes suitable ex-government material can be picked up at the junk yard. The iron is quite soft and

easy to drill and saw, and although the work can be carried out using a 12-in. hacksaw and hand brace, the drilling will be made much easier if a drilling machine is avilable. To make a good job, with not too much hard work, the main frame can be welded. The local garage would do this for a few shillings ; this would cut out all the heavy drilling. If the frame is welded, the lengths of 1 in. by $\frac{1}{4}$ in. can be butt jointed, and consequently they will be cut shorter to allow for this.

Making a Welded Frame

After the pieces have been cut to size, they should be drilled for the hinges, scrolls and gate-catch. They can then be laid out in their correct order and welded at each joint. There is no need to run the welding right through, if the frame is tacked on one side and then turned over and treated in a similar manner, the job will be found to be quite strong enough. It is a good idea to make several checks for squareness as the work proceeds.

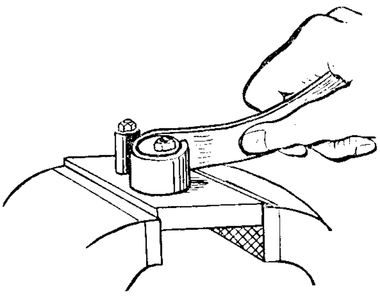


Making a Riveted Frame

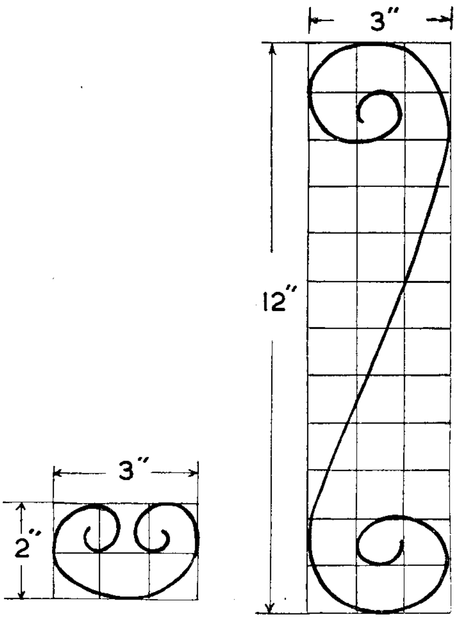
In making a riveted frame, the pieces should be cut to the dimensions given in the drawing. The ends of the three vertical pieces are then reduced by drilling and sawing, or if preferred, by sawing and finishing off with a file, to form a $\frac{1}{4}$ in. diameter peg at each end to pass through the top and bottom rails. The four short horizontal pieces must be treated in a similar way, since they are to pass through the vertical pieces.

The four corners of the frame are to be joined by the open mortice and tenon method. While this might not be considered the best type of joint, it will be found to be quite strong enough when the gate is fully assembled. The slots in the top and bottom rails are made by drilling two $\frac{3}{16}$ in. holes at a $\frac{1}{4}$ in. from each end and sawing the slots out with a hacksaw. The slots are then finished with a file, making them $\frac{5}{16}$ in. long and $\frac{1}{4}$ in. wide. This will allow for closing the ends over when assembled. The two outside vertical pieces are then cut at each end with the hacksaw to form the tenons. These reduced end sections should be $\frac{5}{16}$ in. long to allow for peening over.

The pieces should then be marked out for drilling the $\frac{3}{8}$ in. diameter holes. It will be noticed that the centre vertical piece is not drilled,



and if a glance is made at the scroll drawing, it will be seen that when assembled they form two panels 24 in. by 12 in. These are points to notice before the $\frac{1}{4}$ in. drilling takes place, so that when the frame is assembled, everything will be in order. The frame should now be temporarily assembled ready for marking-out for the scroll rivets. When the scrolls are made,

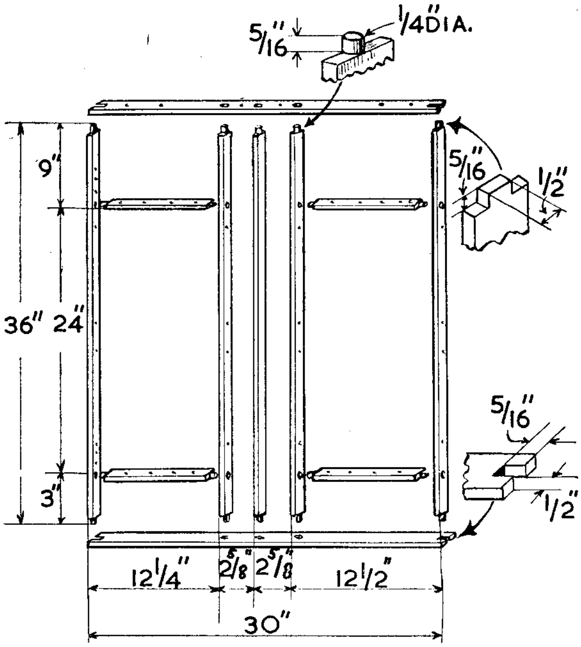


as described later, they are drilled and placed in position in the frame. The holes for the scroll rivets can then be marked out with a scriber.

Making the Scrolls

It will be seen that there are only two types of scrolls ; this has been arranged so as to simplify the job. The bending of these is made much

easier if a bending jig is used. These are quite easy to make, the details being shown in the accompanying drawing. There are eighteen 6 in. scrolls to be made from 27 in. lengths of 1 in. by $\frac{1}{8}$ in. and four 3 in. scrolls made from 10 in. lengths of the same material The shape of these should be drawn out on a piece of cardboard, to be used as a template or pattern.



The bending is adjusted by turning and then locking the eccentrically-drilled pin so that the metal to be bent will just pass between the two rollers. The scrolls are then bent by feeding one end of the metal between the pins and bending at each move to obtain the correct shape. Checks should be made on the template at each stage, and when one half of the scroll is finished, the other end should be fed through the pins in the same way.

When all the scrolls are completed, they should be marked out for drilling. This is best done by placing the scrolls in position in the frame; drilling the rivet holes in the frame should be left until after the scrolls have been drilled. Before the scrolls are removed for drilling, they should be numbered with chalk or pencil. After drilling, place the scrolls again in position and check that the holes are all correct. The scrolls can then be riveted together, first in pairs, then fours, and finally in two panels of eight.

Place the two panels in position and mark out the rivet holes in the frame, mark out also the holes for the rivets which are to secure the hinges and the 3 in. length of angle-iron which is to support the gate-catch. Dismantle the frame and drill all the holes, not forgetting those in the top rail for the scroll rivets.

Final Assembling

Fit the four short horizontal pieces to the two drilled inner vertical pieces and peen over the ends of the short pieces to secure them firmly to the vertical pieces. Fit these to the top and bottom rails, interposing the centre vertical pieces, and add the two side rails. Peen over the ends of the vertical pieces and then the horizontal pieces. Finally, hammer up the corners to make good tight joints.

Fit the two scroll panels in position and secure with rivets. Drill and rivet a pair of 3 in. scrolls together, then secure these to the two 6-in. scrolls for the top rail. Rivet a 3-in. scroll to the end of the two 6-in. scrolls, then rivet the assembly to the top rail. All that remains is to secure the angle-iron to the gate-catch, and then rivet the two to the frame, and fit the two hinges. The hinges are of the ordinary butt-type of suitable size, and these are either riveted or bolted to the frame.

A Drilling and Milling Spindle

(*Continued from page 169*)

to ensure that the periphery, bore, and sides are accurately located with relation to each other. If the facilities are available, it would be valuable to have this component cyanide- or case-hardened. In this case a steel plug should be threaded into the tapped hole so that the hardening process will not affect the internal thread, which may result in the threads becoming over-brittle.

A short length of aluminium alloy was employed for the pulley. Obtained by the simple expedient of melting down some scrap in a ladle and casting it in a mould bent up from tin.

The final job was the oiling screw made from a short length of brass bar, the head being slit by means of a fine hacksaw blade. In addition, a washer was made from some 1/32 in. thick fibre to act as an oil seal beneath the screw head.

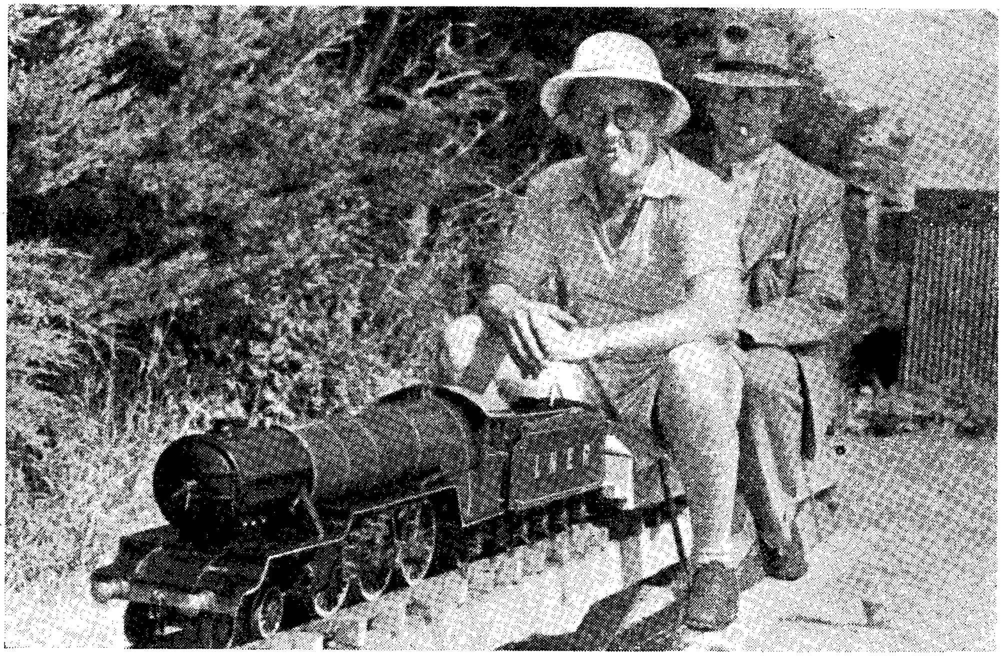
The spindle was then assembled and lubricated with thin machine oil, belted up to an *ex*-vacuum cleaner motor with $\frac{3}{16}$ in. diameter round leather belting and run-in for a few minutes. It was then stripped, cleaned, the old oil drained out and fresh added, and reassembled, plus a coat of paint on the unmachined portions of the body casting.

Should any reader be interested in making a similar spindle, I would be pleased to assist him in obtaining the necessary casting from my pattern, if he cares to communicate with me *via* the Editor.

A Lobby Chat on Making Do

by "L.B.S.C."

MUCH of my recent correspondence has been concerned with ways and means of carrying on with small locomotive building, despite the switching of the materials required, to the bloodshed-and-destruction racket; so maybe a few words on the subject will not come amiss. I must confess to writing this with a sad heart; for never in my wildest flights of imagination, did I ever dream that it would be an offence against the law, to purchase a bit of copper for the purpose of building a small locomotive boiler, or castings in bronze or gunmetal for the cylinders and other parts, because of the requirements mentioned above. Yet such is the state of affairs in this year of disgrace 1951; *what* a testimonial to so-called "civilisation"! Still, there it is; so let's see what can be done under the existing circumstances. I am thankful to say that, personally, I am not affected by the ban on supplies. In days gone by, I made a weekly pilgrimage to town on the gasoline buggy, and delivered my copy and drawings to our editorial offices in person. That chore done, I used to have a cruise around, visit the metal-merchants' and other stores, and do a bit of over-the-counter shopping. It was my invariable practice to purchase more than I needed for the particular job in hand; consequently, when Adolf the Unworthy lifted the lid of Hades in 1939, I had quite a respectable "stockpile," as it is now called. There is still a fair amount left; sufficient for *Britannia* and the other jobs I have in hand. Our approved advertisers also sent me samples of the castings and other oddments which they proposed to put on the market, for building locomotives described in these notes; so I hope to have sufficient material to see me through. Others, unfortunately, have not been so lucky.



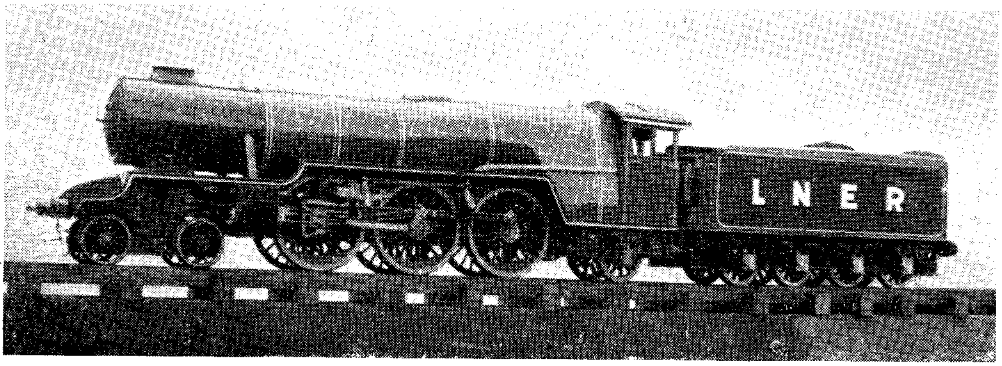
Mr. Shenton driving the "Maori" Lassie

Alternative Castings

How long it will last, there is no telling; but at the time of writing, iron and aluminium castings do not come under the ban. Wheels should therefore be available "till further notice." Parts normally cast in bronze or gunmetal, such as eccentric straps, hornblocks, axleboxes, frame stays, bogie bolsters and centre castings, pony truck frames, dummy springs and horncheeks for tenders, and such small items as buffer sockets, chimneys, dome and safety-valve covers and so on, would be quite satisfactory in cast-iron. They usually *are* cast-iron, or in some cases cast steel, in full-size practice.

It is when we come to the " wet " items, that the trouble commences ; a cast-iron pump or injector body would be useless in the small size, on account of rusting trouble. However, a cast pump or injector body in aluminium, is a feasible proposition, but there are reservations. Pump valve seatings, and the gland, would need to be in gunmetal or brass, on account of the softness of aluminium making it unsuitable for those purposes ; but it is a pretty safe bet that the scrap box, usually found in most home workshops, could produce one or two odd ends of bronze, gunmetal, or brass rod, sufficient for the gland and valve seats. I keep a tray in the drawer in the bench directly under my Boley lathe, and this is divided into two compartments. One contains all the odd ends of brass and screw-rod, and the other the bronze and gunmetal short ends, including cut-off chucking pieces. I can always find material there, for such purposes as suggested above.

Aluminium could also be used for some of the parts mentioned above, that are not subject to wear, and would be painted over ; for example, chimneys, dome covers and safety-valve casings. The light weight of such components, compared to the weight of the complete engine, would not affect the adhesion of the coupled wheels to any appreciable extent.



A " Hielan' Lassie " built in New Zealand

A Gleam of Light

Here is an item of interest for those good folk who make their own patterns, and get them cast locally, or else buy their castings from a supplier who is his own foundryman and pattern-maker. I was informed by a friend in the foundry line, that whilst the " b-and-d " restrictions prevent the advertising and selling of bronze and gunmetal castings, there is nothing to stop him from melting down any pieces of metal sent to him by a customer, and re-casting the said metal in any desired form. It would thus appear that anybody who has a junk-box full of obsolete, defective, or spoilt castings, can work the Aladdin stunt without breaking the law and rendering both himself and the foundryman liable to be stood up against the fence and shot at dawn ! In any case, I certainly cannot imagine the " powers that be " being stupid or bureaucratic enough to raise objection to such a procedure, when it is expressly for the purpose of furthering an educational hobby. They moan enough about the decadence of craftsmanship, and freely give away large sums of money to organisations for spreading education, culture, etc., among people of other countries ; 'nuff sed !

Cylinder Substitutes

The pros and cons of cast-iron cylinders have been argued out so many times in this journal, that there is little or nothing to be added to what has been said and written. However, when it is a case of cast-iron cylinders or none at all, the aspect is completely altered. The only way to deal with cast-iron cylinders, to prevent rusting and pitting as far as possible, is to flood them with cylinder oil when the engine has finished a run. Pistons and valves of non-rusting metal should always be used. The dural piston which I fitted experimentally in the huge low-pressure cylinder of my Webb compound *Jeanie Deans*, has now completed nearly five years' work—she started running in the late summer of 1946—and has proved perfectly satisfactory ; so I should have no hesitation in fitting pistons of this material. Builders who can obtain a scrap piston from a modern automobile engine, can easily melt it down themselves, by aid of a pan of coke, a plumbers' ladle and a good blow-lamp, and cast pistons for themselves in home-made open moulds.

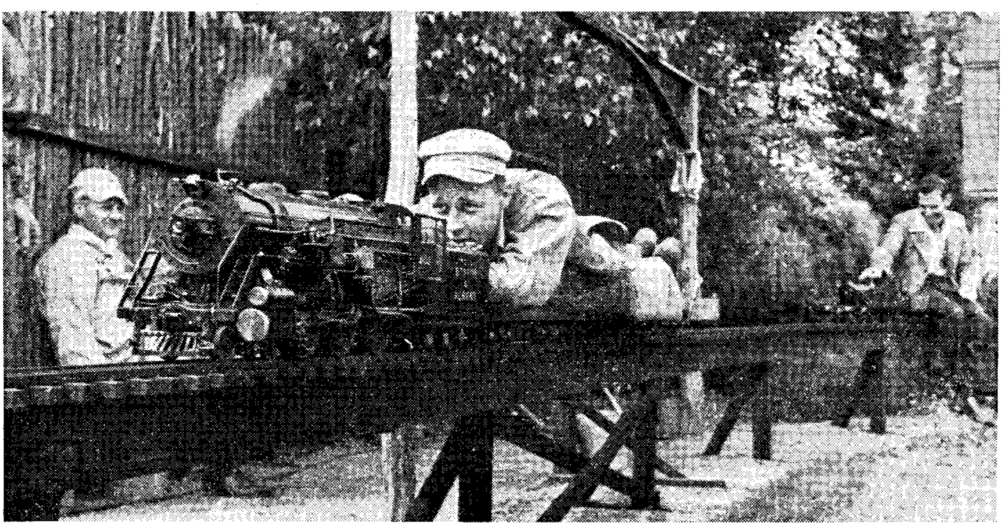
The scrap box, again, may yield a short end of bronze or gunmetal rod that could be utilised for a piston for use in a cast-iron cylinder ; rustless steel could also be used if available (loud cheer from our old friend at Worthing) and pistons can be built up by using two discs with a smaller diameter spacer between, the whole being turned truly on its own rod in the usual way, and the space between the discs well packed with graphited yarn. Where a locomotive is only used intermittently, I wouldn't recommend cast-iron pistons, with rings, for any cylinder less than about 2 in. bore. In days gone by, when I used to do a bit of repairing and overhauling for friends, I've seen quite enough of the effects of rust inside cast-iron cylinder bores and on port faces, to sound a loud warning. Never

mind what other folk tell you; the only thing that really teaches is practical experience, and plenty of it at that, same as I have had. The last one I tackled, with cast-iron pistons in ditto cylinders, needed a full $\frac{1}{16}$ in. taking out of the bores, to remove all the pit marks; and despite the rustless steel valves, the same amount had to come off the port faces. I made new port faces from two cast bronze steam-chest covers which happened to be just a little larger than the port-face area, and re-used the original valves. New bronze pistons replace the old cast-iron ones; and an efficient mechanical lubricator looked after the oiling business. The engine is still running; but I should never take on another, for all the tea in China. Nowadays, I don't get enough time to do a quarter of the locomotive work I want for myself!

"Tilly" says it's a long way to Southend!

Another Alternative

Several readers have suggested the use of aluminium cylinder castings, with liners of harder metal in the bores. Aluminium alloy cylinders are not a new idea, by long chalks; in the early days of this journal, half a century ago, Mr. A. P. Drake, then in business at Paley Terrace, Bradford, if I recollect rightly, advertised sets of castings for the then famous N.Y.C. "Empire State Express" engine, a 4-4-0 No. 999. Driver Charle Hogan was reputed to have touched $112\frac{1}{2}$ m.p.h. with the big sister, when making up time with the above-mentioned train; and although it was laughed at on the British side of the pond, as "Yankee boasting," I don't doubt it for one minute. She was in top fettle and well "tuned up," as indeed were all the engines pulling the crack trains; she was bigger than any British 4-4-0, had 7 ft. driving wheels, and was only pulling four cars. If the "doubting Thomases" had been on the footplate of old *Ventnor*, *Fairlight*, *Lullington* or others of that ilk on the L.B. & S.C. Railway when running relief excursion trains (go as fast as you like if you've "got the road") they would have been inclined to sing a different tune—that is, if they had any breath left to sing it! Those old cats, as soon as they cleared the summit in Balcombe Tunnel, would just take the bit between their teeth, in a manner of speaking, and go like the very dickens, whizzing through Copyhold and Haywards Heath, and "rushing" the slight rise to Clayton Tunnel; and it was a standing joke among the enginemen, that if we didn't shut off after leaving that tunnel, the next stop would be in the English Channel, about halfway across to France! A check-up on the point-to-



"Articulated" driving!

point times would have revealed that the Great Western wasn't the first to " do ninety." Those were the days!

Getting back on the main line, friend Drake's castings were made of a special alloy, which machined up very well indeed, and was quite suitable for the comparatively low steam pressure, wet steam, and light loads of those days. The light weight of the metal was a great advantage, too, as it reduced the total weight of the complete train (never more than three or four light coaches) and less steam was required to run it. Things have altered now, and weight is an advantage, naturally, when live passenger hauling; whether the alloy would stand up to " redhot " steam at high pressure, would be a matter for experiment, and lubricating arrangements would have to be above suspicion. However, there is no need to take the risk, if the cylinders are lined with thin bronze bushes. The kind of metal used for bushes in motor-car and general machine work could be used; in fact, I daresay scrap bushes could be purchased from any garageman who undertakes repair work. These could easily be press-fitted into bored aluminium castings, and reamed after pressing home, the *modus operandi* being exactly the same as I have fully described for fitting piston-valve liners. I shouldn't dream of recommending this sort of thing in the ordinary way; but as the old saying goes " Needs must when the devil drives "—and believe me, he is some driver! Incidentally, Mr. Drake is still alive and well, though long since retired from business; he resides at Taunton, and writes to me occasionally.

Cast-iron cylinders could be lined, in similar manner, to get over the rusting trouble; I have tried this, and found it O.K., the job being no more difficult than fitting liners to piston-valve cylinders. It is a good wheeze to leave the final reaming until after the liners are pressed home, otherwise the bore may be out of truth through distortion. The reaming may easily be done by hand, as described in previous notes. Cylinders of certain types, such as those used on outside-cylinder engines, with inside valves and link motion (such as *Maisie*) could easily be built up, or " fabricated," to use the modern term. Incidentally, if some of the " boys of the old brigade " heard some of the " modernites " having a discussion, the odds are a million dollars to a pinch of snuff that the former wouldn't know what the latter were talking about! Scrap material could again be utilised; a couple of worn bushes with a few big washers and a couple of small blocks of metal, could be assembled up and silver-soldered together, to form a quite respectable pair of cylinders; and when machined up in the same way as castings, would give service not one whit inferior to the regulation pattern. As a matter of fact, several of my correspondents whose shallow pockets severely limit their expenditure, have resorted to building up everything they possibly can, to avoid expense. Well, I guess there's nothing new under the sun; an enthusiastic and impecunious kid known as Curly, did precisely the same thing about sixty or so years ago! As the old saw puts it, " Sufficient unto the day is the evil thereof ";

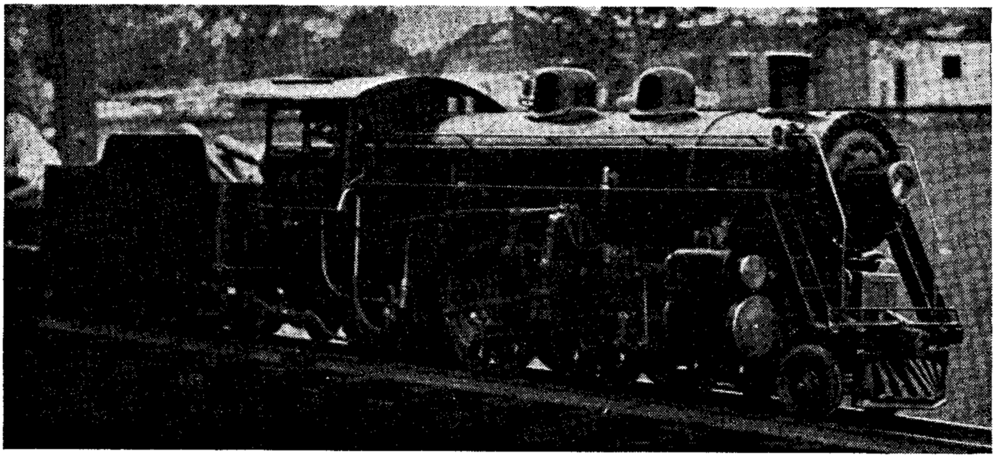
I'll have a word to say about the question of substitutes in boiler and plate work, in a future lobby chat, if all's well.

A " Lassie " of New Zealand

The above dissertation calls to mind, that it isn't always restrictions and priorities that cause supplies to be short or even non-existent. Unfortunately, good folk in remote parts of the world, frequently have difficulty in satisfying their needs; but they usually manage to get over all their troubles. Such a case, was that of Mr. S. C. Shenton, an automobile engineer of Wanganui, New Zealand. A reader of many years standing, he followed these notes with interest, and wanted to build a locomotive; and says that when the outline of *Hielan' Lassie* appeared, he promptly fell for her. Import controls, and other deterring factors in force at the time, made it impossible for him to obtain the materials from our advertisers, so he decided to make his own patterns, and get castings made locally, for everything that could not otherwise be obtained. However, he managed to get suitable wheel and cylinder castings from Australia; but everything else was either cast locally, or fabricated.

The frames are bronze-welded into a single unit. Baker valve-gear was fitted to the outside cylinders, the two-to-one arrangement of conjugated levers operating the inside valve. The boiler is also a bronze-welded job, including the tubes at the combustion-chamber end, but Easyflo was used for the smokebox end of the tubes, and the smokebox tubeplate joint; and the finished job stood 250 lb. water pressure test O.K. Our worthy friend's spare time being limited, it was two years before the engine was sufficiently far advanced to have a steam trial; and that had to be done on rollers, for there was no track available within 100 miles' radius. The results were very satisfactory, so Mr. Shenton went ahead, finished and painted the engine and fixed up a track for her. He said it was a real thrill the first week-end when she went into service; she was in steam about fifteen hours, and did the job in fine style, running away with 60 stone on the car. It wouldn't carry any more! The engine is painted larch green, with cream lining; black smokebox and frame, red beams, and red in the flutes on coupling- and connecting-rods, and she looks quite swell. Our friend concluded his account of the job by a cordial appreciation of my instructions, for which I thank him very much, and in turn offer my sincere congratulations on a good job well done. My notes would be useless if the readers of them lacked the " savvy " to carry them out! In passing, several readers have pointed out that more locomotives have been built to your humble servant's designs, than from those of any full-size C.M.E.; and judging from my correspondence, and the amount of castings and material sold by our approved advertisers, it would appear that such is the case. I think *Juliet* and *Tich* head the list, with *Maisie* and *Princess Marina* as runners-up. You find them all over the world!

I've just received, time of writing, a word of appreciation about the hot-water injector I made for Billy Van Brocklin's Tilbury tank engine, as a friendly gift. He says it uses very little steam, and



An injector experiment—note overflow pipe

works perfectly. The reproduced picture shows the little engine at work, but she is a dickens of a long way—over 3,000 miles!—from the Fenchurch Street-Southend line. Bill tried another wheeze with one of my injectors; by bringing up the end of the overflow pipe above the tender water level, he is able to leave the water turned on all the time, at the correct adjustment, and the injector starts right away, merely by opening the steam valve, the water keeping it cool.

The Golden Gate Live Steamers' Track

(*Continued from page* 167)

gratulated on the fine mechanical condition of their locomotives.

One incident marred the smooth running of the railroad on the third day of the meet. Tim Reardon, vice-president of the G.G.L.S. was at the throttle of Gordon Corwin's 4-8-4. The S.C.L.S. operate their machines by sitting on the tender with the feet resting on stirrups fastened to the frame just under the firebox, due, no doubt, to the fact that their home tracks are laid on the ground. This driving position looks, and undoubtedly is, somewhat precarious when the engine is running on tracks elevated 2 ft. or more above the ground and balancing is not so easy. However, whatever may have been the cause, after rounding one curve the engine appeared to lift at the front end and rolled off on to the ground with Tim on top of it. Other than a slight bruise or so Tim was unhurt which was fortunate as it takes very little imagination to realise that the fall could have had serious results. The damage amounted to a few bent brake rods and some twisted piping and there appeared to be no reason why the engine could not have been fired up and run again; which is exactly what was done and proved to all and sundry that a steam locomotive can take a flying leap and keep going if you will give her a helping hand to get back on the track.

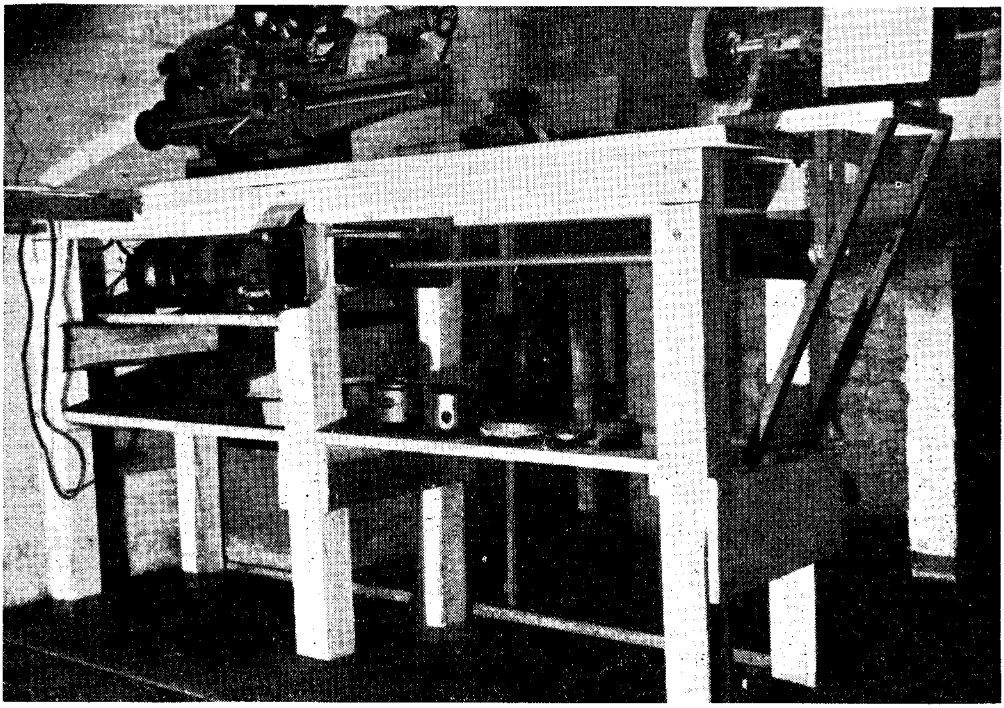
As for our home gang's engines, Walter Brown's 1-in. scale S.P. switch engine made its first appearance and its first run on rails, under steam. It is a beautiful piece of work and it performed just about the way it was expected to. It uses a minimum of fire and water and handles its loads with little or no apparent effort. Walter is to be congratulated on his handiwork and its results. Our genial secretary, Harry Dixon, had lubricator trouble with his side tank engine. This engine is a very fine piece of work and no doubt when the valve oil difficulty is overcome it will run and work just the way the builder expects it to.

On the evening of the track opening date, visitors, guests and hosts met at Vic Shattock's basement where a number of locomotives built by some of the G.G.L.S. members were on display; some were finished to the point of being able to operate under air pressure, while others were in the embryo stage. Among these were Tim Readon's 4-6-4 and Fred Daley's 4-6-4, both $3\frac{1}{2}$-in. gauge; both engines should be ready for the track next year. Larry Duggan showed his fine moving pictures, following which coffee and doughnuts were served. All in all, everyone appeared to enjoy the occasion and went home to bed feeling tired but happy.

ONE MOTOR — TWO MACHINES

A Simple Adaptation

by E. E. Gilbert



HOME mechanics contemplating adding to their workshop equipment must often be confronted by the twin problems of space and expense. Buying a new machine is one thing; to arrange it conveniently and also provide its drive without going to the expense of a second motor may be quite another. If there are other readers similarly placed, they may be encouraged to know how a totally unskilled operator, having no technical knowledge or training, overcame the difficulties with entirely satisfactory results.

My job was to hitch on to the motor driving the lathe one of those handy combinations of grinder, polisher, circular saw and drill. First it was necessary to refix the bench at a right-angle from the wall to which it had been bolted. This was to allow clearance for passing stuff over the saw and space to bring large objects to the drill. Sufficient rigidity was obtained by fastening one end of the bench to the wall and the other to the floor.

Also, to allow of wide material being applied to grinder or saw, the machine had to be placed well away from the lathe. This was accomplished by mounting it on a strutted extension to the bench.

A 4 ft. length of shaft, coupled to the motor spindle, runs the full length of the bench underneath. Its bearings, turned from brass tube, have flanges left on one side. Through these they are screwed to wood cross-pieces fixed between the legs.

No oilers are fitted. A little lubricant placed occasionally on the shaft is quite sufficient even on long runs. The Startex overload-tripping switch, mounted at the front of the bench, is within reach while working at either machine.

Teething troubles arose from the triple-peg and drilled-plate coupling first used, and through having too large a pulley driving the extra machine, which it turned at a needlessly high speed.

Harsh and intolerably noisy, that coupling was replaced by a Renold flexible. This, besides running silently and affording some cushioning

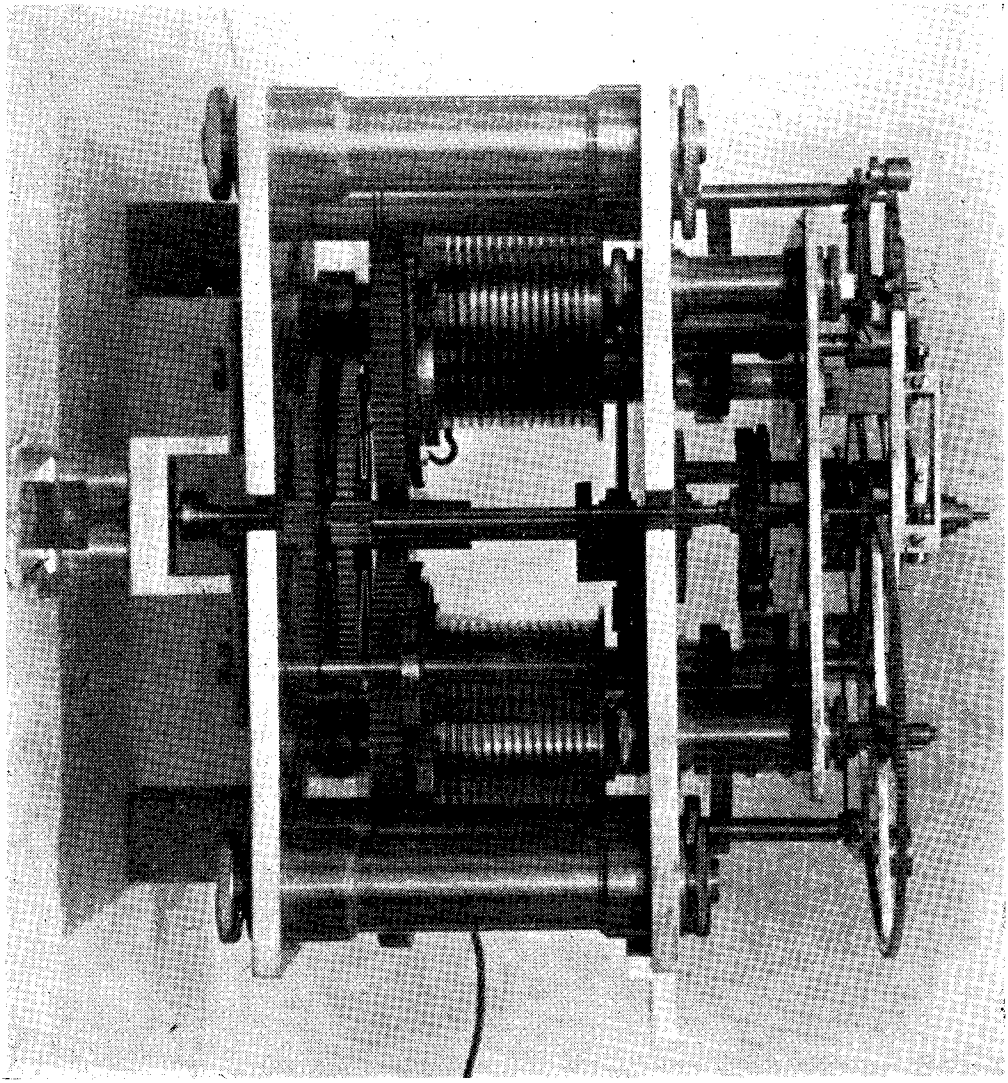
(*Continued on page* 190)

*CONSTRUCTING A YEAR CLOCK

by C. B. Reeve

THE action for the short and long months will now be described. Fixed to the axis of the month wheel and turning with it is a pinion of ten leaves which engages the teeth of an intermediate wheel of any number of teeth. This intermediate wheel meshes with another wheel containing 120 teeth and is the year wheel which makes a complete revolution in twelve months. This wheel is shown in the drawing occupying the lowest central position in the movement. On the axis of this wheel is fitted the hand that indicates the various months of the year. Also superimposed on this wheel is a smaller wheel containing 36 teeth, which drives a larger wheel containing 144 teeth which turns on its axis once in four

*Continued from page 134, " M.E.," August 2, 1951.



View of movement from above

years. This last wheel is indicated in the drawing on the left-hand side of the movement beneath the cam wheel to which the latter is screwed. There are 48 divisions on the circumference of the cam wheel, this being the number of months contained in four years. There are 28 uncut portions on the rim of the cam wheel corresponding to the 31-day months, 16 shallow slots corresponding to the 30-day months, 3 deep slots corresponding to the months of February with 28 days each and one slightly less deep for the month of February in Leap Year. There is a pin placed in the 31-day month wheel opposite the tooth representing the 28th day of the month. Situated on the detent is a bell crank lever freely pivoted and on its lower extremity is a pin which rests on the circumference of the cam wheel and by its own weight the bell crank lever will cause the pin to enter any of the slots on the cam wheel as it rotates the four-year wheel beneath it.

It will be easy to see that when the pin rests on the highest step on the cam wheel the opposite end of the bell crank will also be in the highest position and will be out of reach of the pin in the 31-day month wheel, but when the pin on the lower end of the bell crank has fallen into one of the shallow slots (corresponding to the 30-day month) the upper end of the bell crank will have arrived at a lower position and the notched end of the lever will be in a position to move the 31-day month wheel forward one tooth. This will occur on the night of the 30th of the month as the detent is finishing its travelling to the right. On the detent being released by the pin in the 24-hour wheel it will return to its normal position and in so doing carry the 31-day month forward one more tooth and thus bring the date to the first of the next month.

For the month of February containing 28 days, the pin on the lower end of the bell crank lever will have fallen into one of the deepest slots and the upper end of the bell crank lever will be at its lowest position on the night of the 28th and its notched end will then advance the 31-day month wheel three teeth as the detent travels to the right; on being released again it will still move the 31-day month wheel one tooth forward on its return journey to the left and bring the date to the first of the next month.

For Leap Year the same action takes place, but as the slot in the four-year cam is made slightly shallower, the notch in the bell crank lever will only advance the 31-day month two teeth as the detent makes its excursion to the right, and on its return journey to the left the 31-day month wheel will again be advanced one tooth. The pin in the bell crank lever will slide out of the shallow slots of the four-year cam wheel quite easily. The bottom sides of the slots are sloped away for this purpose. In the case of the deep slots, this is not so easy owing to the angular movement of the cam wheel, but in order to accomplish this, there is a shaped finger fitted to the axis of the year wheel and turning with it. The extremity of the finger will pick out the pin and prevent it, for a time, re-entering the slot again until the four-year cam has moved on sufficiently for the slot to be out of reach of the pin. As a further precaution to prevent the pin entering these deep slots again after it has done its work, there are shutters fitted and pivoted on small shouldered screws. These automatically open and shut by their own weight according to their position as the cam wheel rotates. These are not shown in the drawing but can be seen in the photographs.

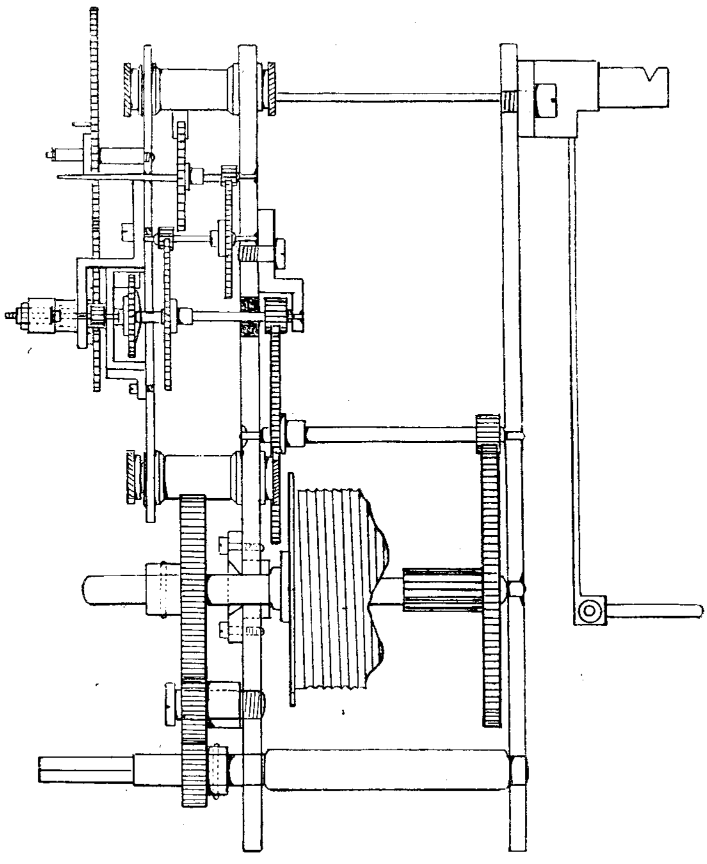
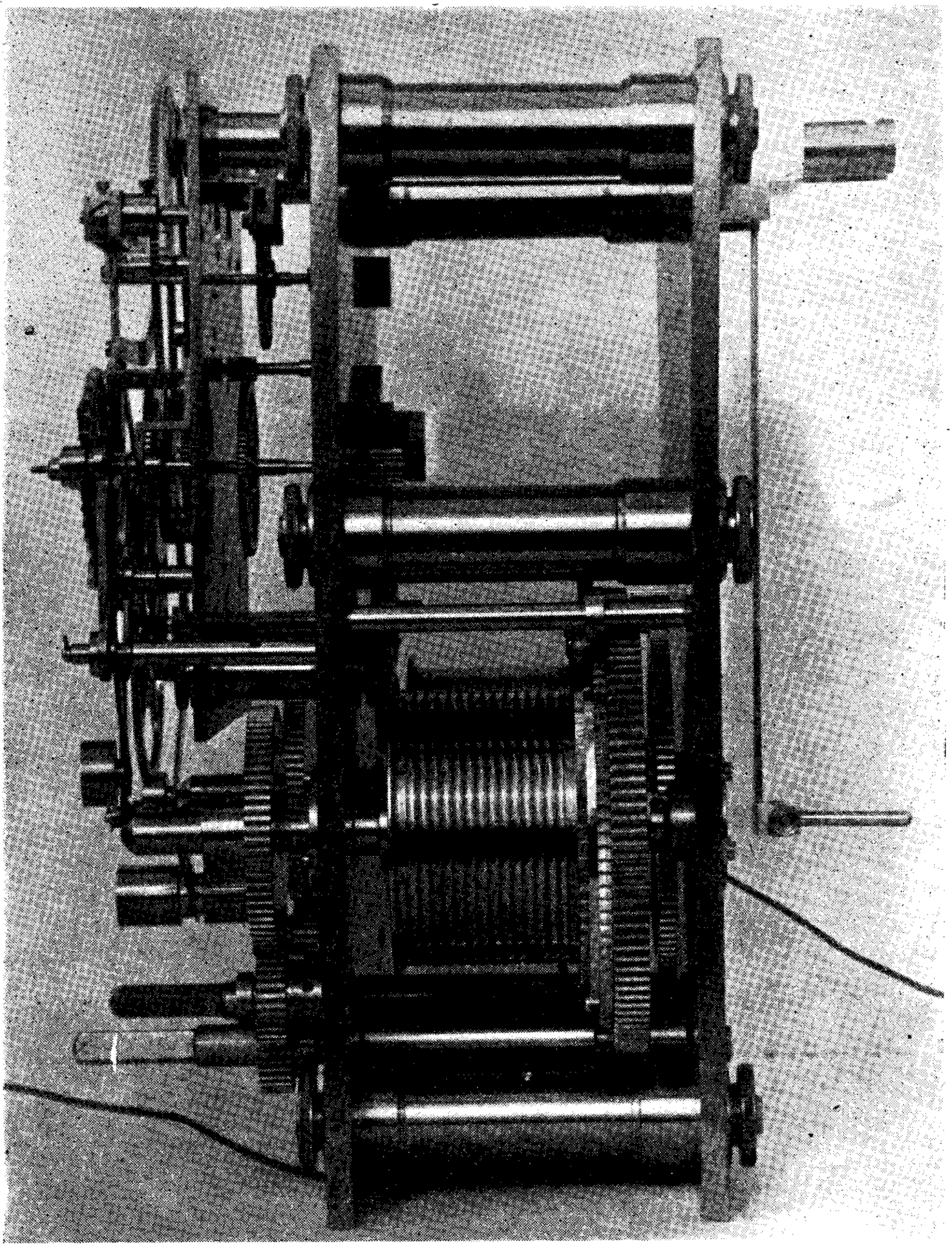


Fig. E

The next item made was the square dial which was a fairly straight-forward job. The raised



Side view, looking from right

chapter ring was engraved but the lettering in the four smaller dials was painted on, the idea being to have these engraved professionally after the clock had been exhibited.

Cutting the circular openings for the small dials in the back plate of the dial was an interesting job. The writer obtained a tool used by plumbers for cutting holes in water cisterns, and by altering the shape of the cutter it was possible to produce a nice chamfered edge to the circular openings. The tool was fitted to the carpenter's brace and by operating this very slowly a nice clean result was obtained with no chatter marks, and very little after-treatment was required.

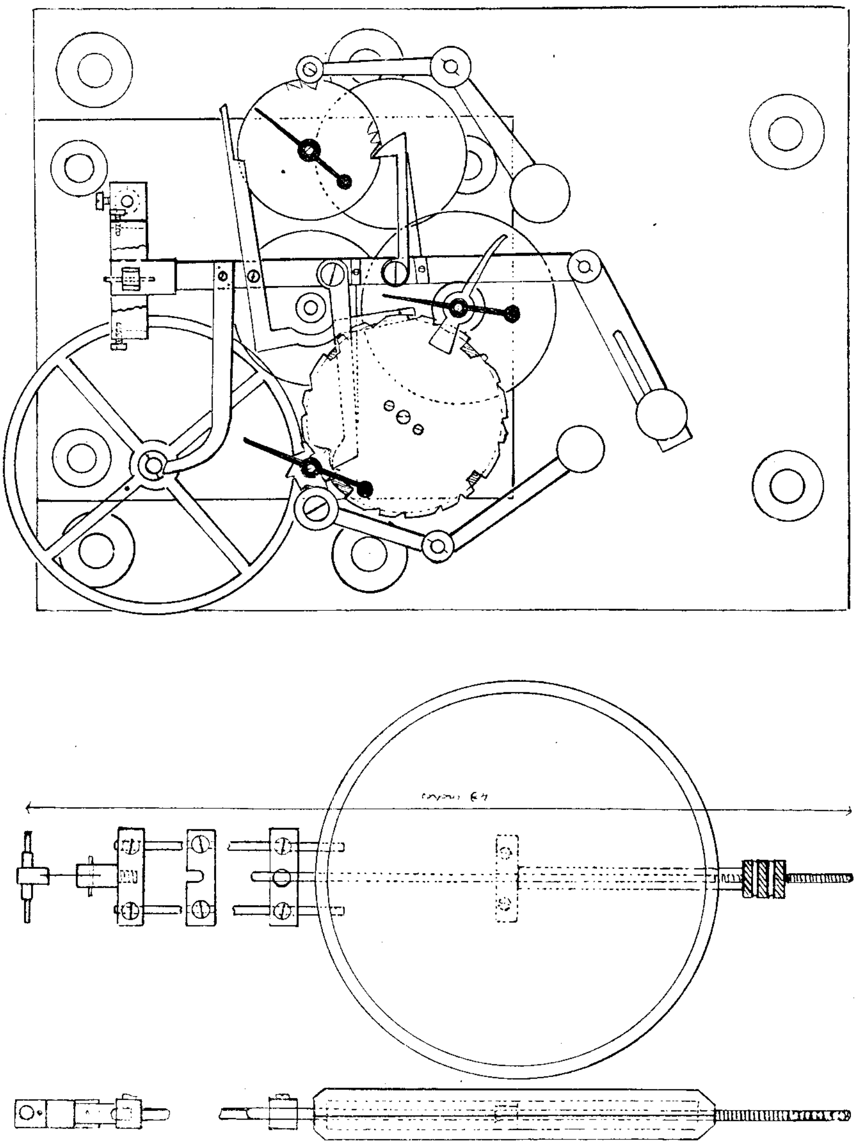


Fig. F

Time was now getting on and a start on the clock case was made during the Easter week-end. The trunk of the case was made detachable from the base as the writer found it much easier to construct this type of case in two sections.

One axiom that is necessary with woodwork is that all the tools must be kept in the sharpest possible condition.

The case was finished towards the end of May and by June 1st the movement was set in the case and the job considered finished. The clock was set going and behaved very well and was left alone until Sunday, August 6th, 1950, when it was taken down and the various parts packed up for the journey to the "M.E." Exhibition. The case just before packing was given the once-over with beeswax and turps.

On the eventful Tuesday afternoon of August 8th it was all packed into a Morris 8, the writer nursing the movement on his lap all the way to the Horticultural Hall so as to avoid disturbing the calendar work of the movement.

IN THE WORKSHOP

by "Duplex"

95—* Making a Sand-blasting Appliance

THE body, part *A*, is made from a piece of duralumin or other material to the dimensions given in Fig. 8.

After the component has been sawn and filed roughly to shape, the work is clamped in the lathe toolpost for machining the abutment faces for the control valve and the nozzle base either by end-milling or fly-cutting; at the same time, both these seatings can be drilled, bored, and tapped. These two faces lie at an angle of rather less than 90 deg. to one another, but they can easily be aligned with reference to the face of the chuck. The seating for the valve itself is best machined with a D-bit to make sure that the bottom of the bore has a flat face.

The Control-valve—Part B

As shown in Fig. 9, the control-valve is made up of three parts; the valve with its spindle is turned from a single piece of brass, as are also the press-button and the valve guide. The valve head should be made a close working-fit in the body, but, as previously stated, great accuracy in fitting is not essential and a small air leak will not interfere with the satisfactory working of the sand gun.

The Nozzle Base—Part C

This component is turned from a short length of mild-steel rod, threaded $\frac{1}{2}$ in. × 26 t.p.i. at the lower end to screw into the body. As will be seen in Fig. 10, the part is cross-drilled and tapped $\frac{1}{4}$ in. × 40 t.p.i. to take the sand pipe, *F*.

The Air Jet—Part D

A length of $\frac{3}{16}$ in. dia. mild-steel rod is turned to the dimensions given in Fig. 11, and is then drilled axially with a No. 55 drill. The jet is made a light press-fit in the nozzle base.

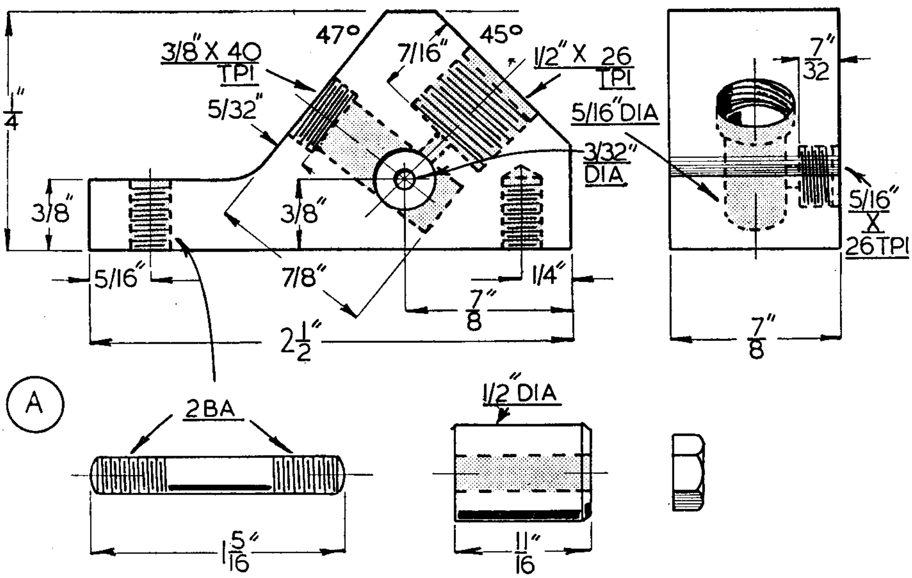


Fig. 8. The sand gun body and attachment parts

The Combining Cone—Part E

As was previously stated, this part can be obtained from the suppliers of the special sand used with the appliance, and a spare cone is included in each tin of sand. Nevertheless, this component can easily be made from mild-steel bar and, although the internal dimensions are not critical, it is advisable to work as closely as possible to the dimensions given in the working drawing in Fig. 12. On completion of the machining, the part is deeply case-hardened.

The Sand Pipe—Part F

This is made of either brass or copper tubing, bent to shape and threaded $\frac{1}{4}$ in. × 40 t.p.i. for screwing into the nozzle base, *C*. The lower end of

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*Continued from page 123, "M.E.," July 26, 1951.

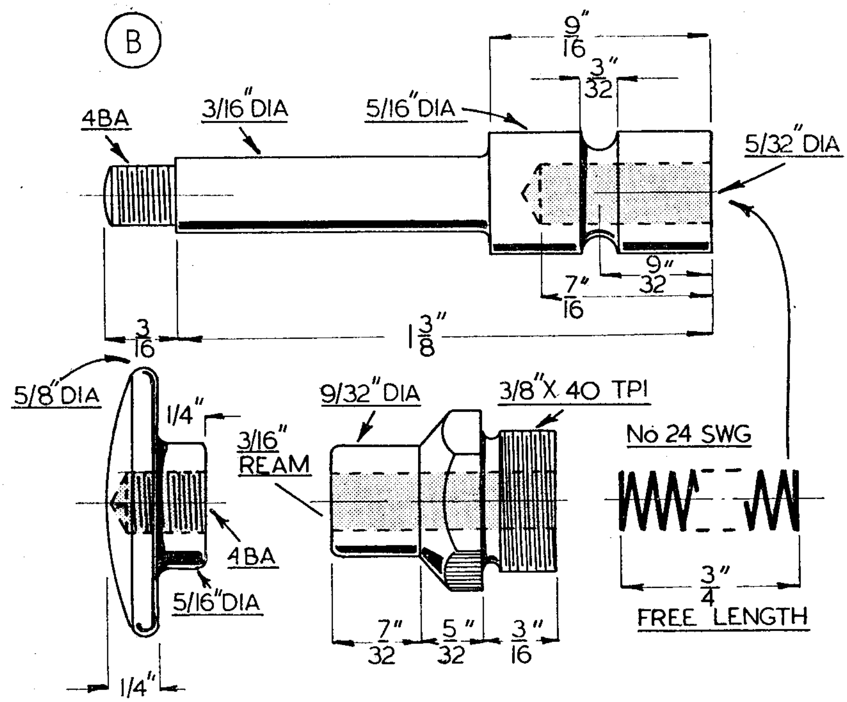


Fig. 9. The control-valve parts

the pipe is sawn across at an angle of 45 deg. to give a clear passage for the sand.

The Trigger Mechanism

Although this additional means of control is not strictly necessary, for the control-valve can quite easily be depressed with the thumb, it will, nevertheless, be found that the trigger mechanism illustrated in Fig. 14 is rather more convenient for starting and stopping the gun. The device is built up on a base strip of $\frac{1}{8}$ in. × $\frac{1}{2}$ in. mild-steel bar, and to this is riveted a pair of $\frac{1}{2}$ in. dia. pillars to carry the cross-shaft. Into this shaft are screwed the bent trigger and the short lever for depressing the control-valve. To prevent any possible binding of the cross-shaft and, at the same time, to ensure that the spring of the valve will return the trigger, the bearing holes in the pillars should be carefully lined up and given ample working clearance.

The Cabinet Frame

The framework illustrated in Fig. 15 is built of $\frac{1}{2}$-in. angle made from strips of tinplate, and

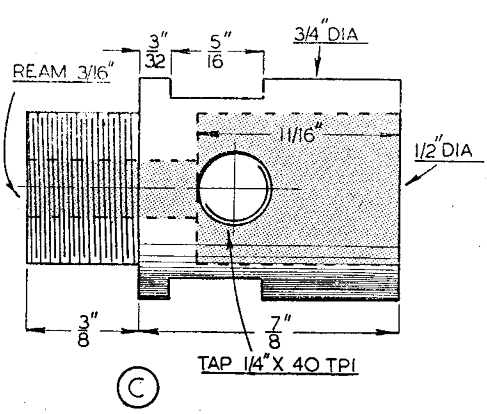


Fig. 10. The nozzle base

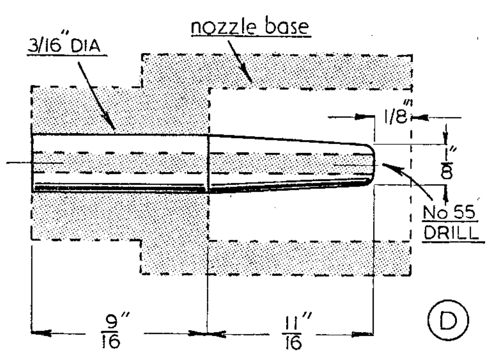


Fig. 11. The air jet in place in the nozzle base

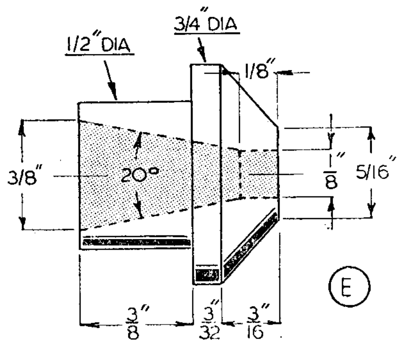


Fig. 12. *The combining cone or delivery nozzle*

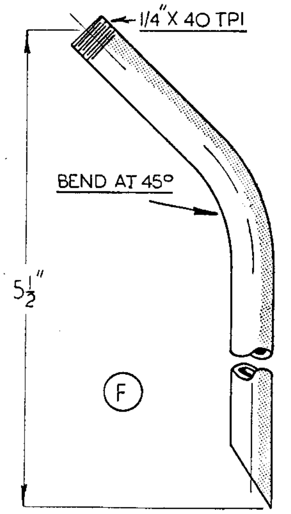


Fig. 13. *The sand pipe*

where required the joints are secured by soldering. Some, no doubt, will prefer to make riveted joints or even to construct a wooden frame. The two cross-members running from the back to the front of the cabinet are used to support the gun and also a small perspex screen that serves to protect the celluloid panelling at the rear. As shown in Figs. 15 and 16, a tinplate sand hopper is fixed to the framework with small bolts, but it is advisable to use rubber strip when making this joint in order to prevent the leakage of sand. A fabric bag should be fitted to enclose the hopper so as to catch any loose sand that finds its way through the joints.

The Rubber Cuffs

These are cut from sheet rubber, and the material should be sufficiently elastic to allow the hands to pass easily through the hand-holes and to give freedom of working within the cabinet.

The rubber end-pieces are secured to the frame with tinplate angle fittings in the manner shown in Fig. 17.

The Glazing

Window glass can, of course, be used for the transparent panelling, but thick sheet celluloid will, perhaps, be found easier to fit. A single sheet of this material encloses the back, top, and front of the cabinet, and is clipped under the angle members holding the rubber end-pieces in place.

Additional fastenings are made to the horizontal frame members by means of small bolts.

The Target

To protect the celluloid panelling at the back of the cabinet, a screen is fitted in the direct path of

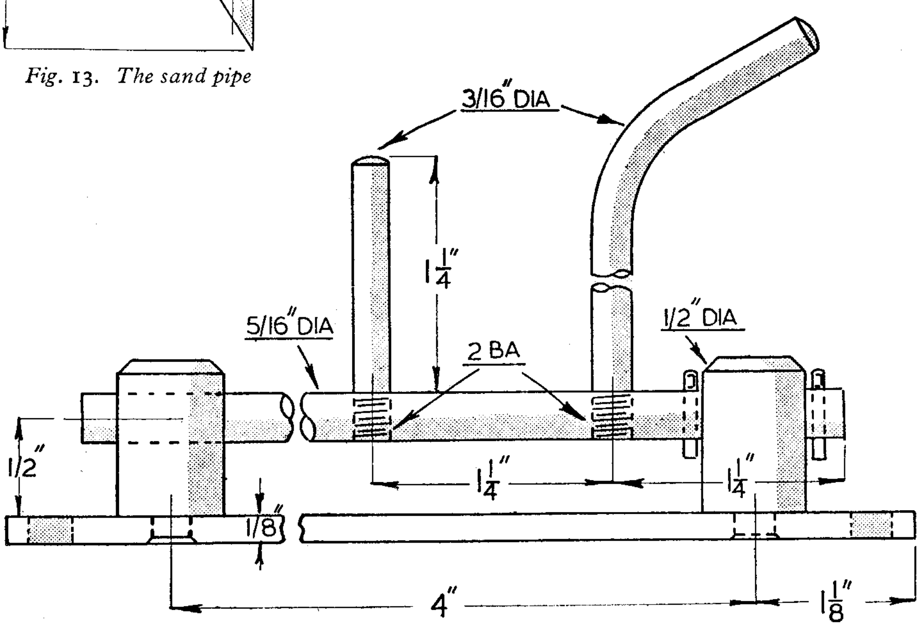


Fig. 14. *The trigger mechanism for operating the control-valve*

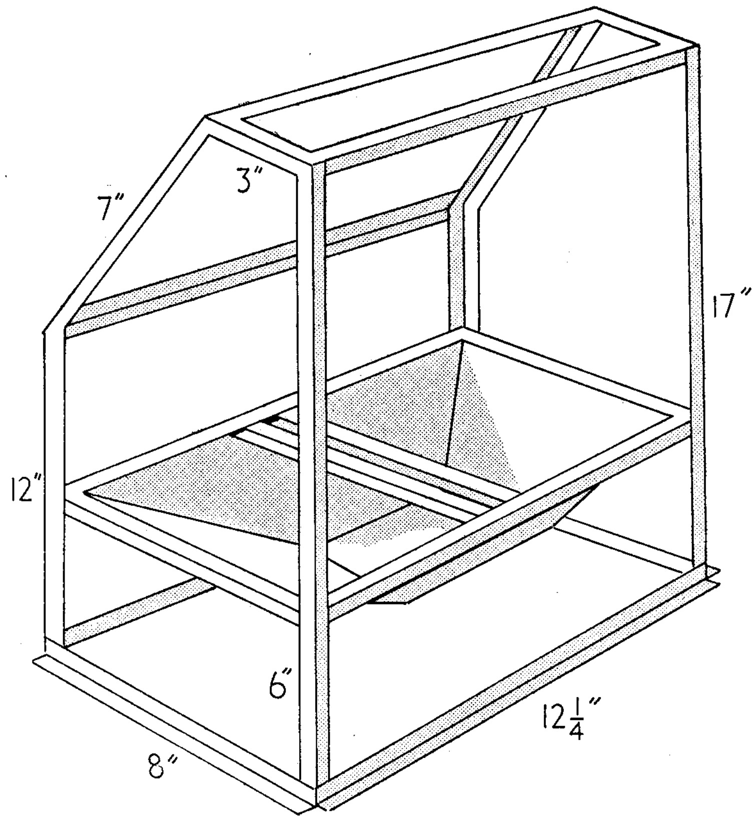


Fig. 15. The cabinet framework

the sand stream. A piece of sheet Perspex, of the size given in Fig. 18, is mounted on a pillar so that the target can be secured to the two cross-members carrying the gun.

The Grille

As shown in the earlier illustrations, a grille is fitted within the cabinet to form a shelf for the work, for it will be found more convenient to sand-blast a number of parts without having to withdraw the hands. As the sand tends to lodge on any flat surface, the grille is made up of strips of sheet material mounted on edge. The spacing-collars, shown in Fig. 19, can be quickly parted off to length with the tubing held in the lathe chuck and brought up against a stop, gripped in the tailstock chuck, to serve as a length gauge.

The grille is not fastened in place, but the projecting ends of the tie-rods rest on the frame members.

Operating the Sand-blast

Though there is no need for the work to be highly finished before being sanded, a satin-like effect will be more readily obtained if the parts are first filed smooth.

The fineness of the grained finish depends largely on the size of the individual sand grains, but the sand supplied for treating sparking plugs gives a pleasing matt surface suitable for finishing most work. Rough castings can be sanded without any preliminary treatment except

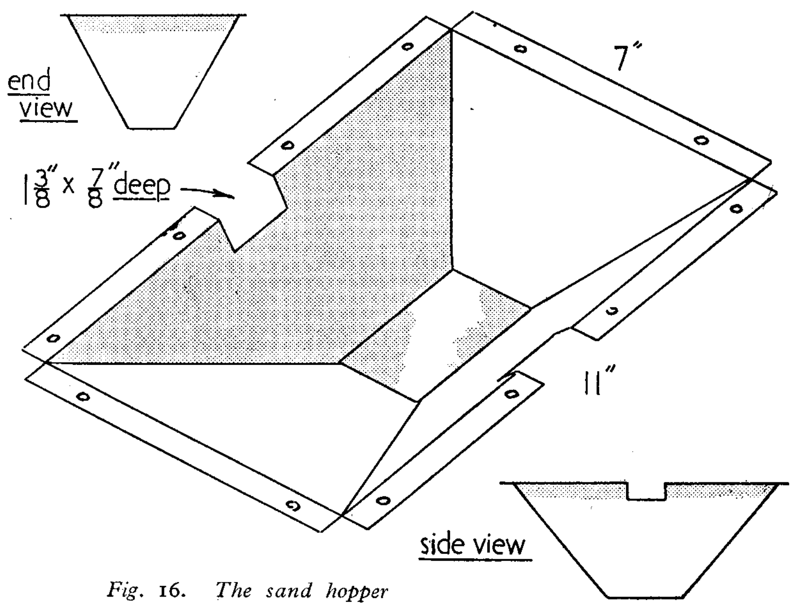


Fig. 16. The sand hopper

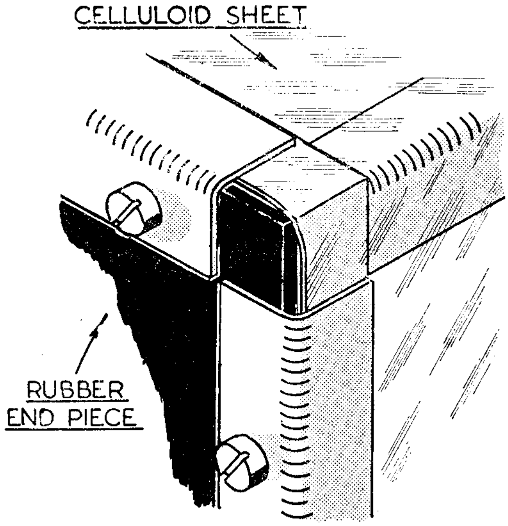


Fig. 17. Method of securing the rubber cuffs to the frame

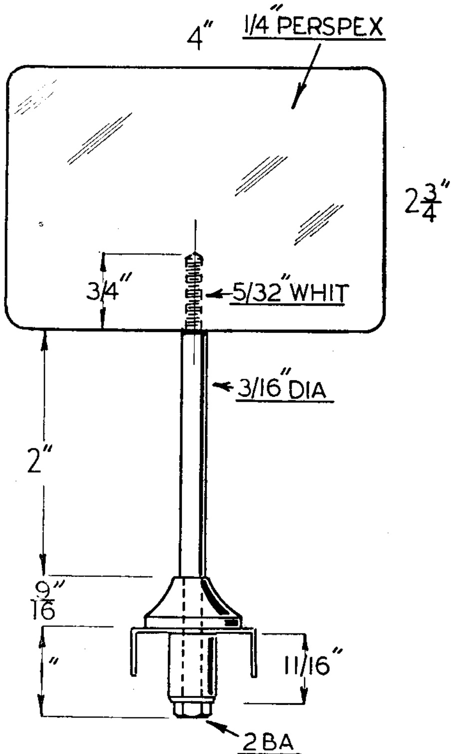


Fig. 18. The Perspex target and pillar

that the ordinary foundry irregularities should be first removed by filing, chipping, or grinding. Nevertheless, this small sand-blast cannot be expected to remove hard surface scale from iron castings in the way this is carried out commercially by shot-blasting.

A knurled finish is much improved in appearance by sand-blasting, as this serves to smooth the tool marks and bring the pattern into greater relief. As steel components will readily rust after sand-blasting, the surface of the work should be protected by wiping with an oily rag.

The higher the air pressure used, and the higher the velocity of the sand grains issuing from the nozzle, the greater will be the abrasive action on the work, but the air pressure is best determined by experiment, for much depends on the nature of the material and even on the form of the work. However, an average pressure of some 50 p.s.i. has been found right for most classes of work, and the volume of air required will depend on the length of time the sand-blast is kept in continuous operation.

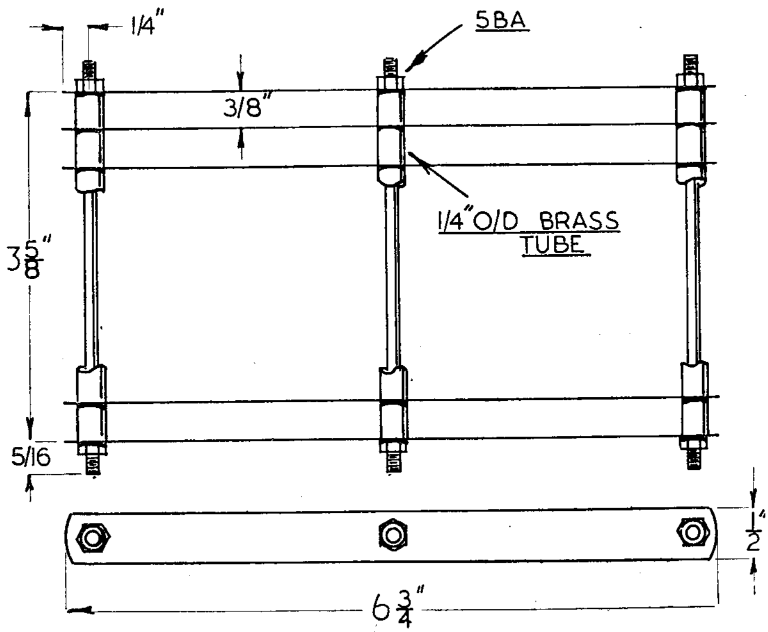


Fig. 19. The work grid

A FIRESIDE LATHE

by J. L. Dymock

IN submitting this descriptive article with photographs of a small lathe of $1\frac{3}{4}$ in. × 6 in. capacity, completed some time ago, I do so with some trepidation, being a model engineer (if I may call myself such), of then little over three years standing.

It was really the urge to make things for my little son, and that in the later war years, which rekindled a latent boyhood interest in model making.

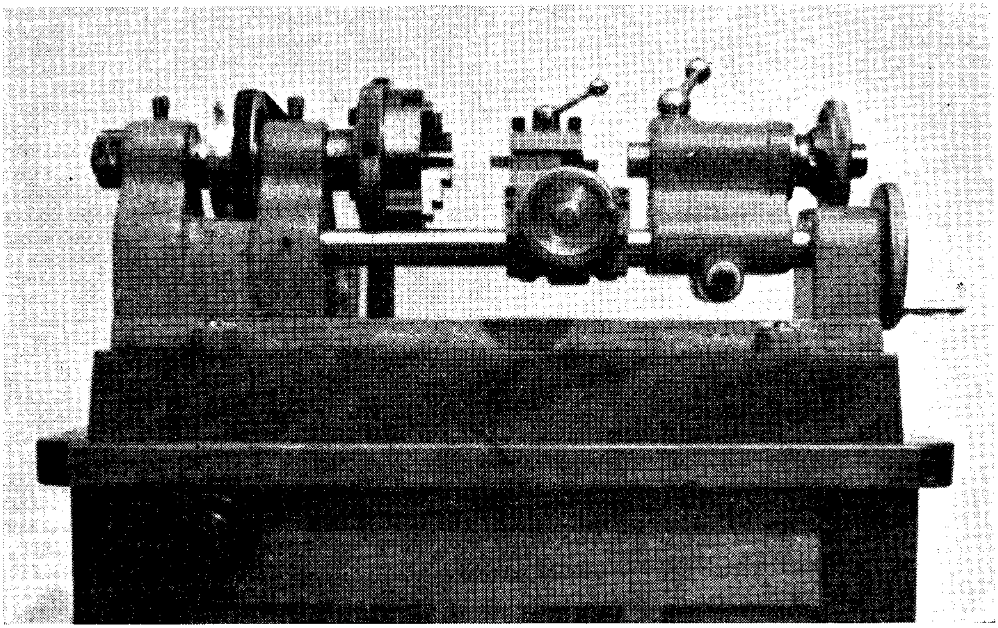
The job which actually set me going was the completion, in wood and metal, in $2\frac{1}{2}$-in. gauge, of the 4-6-4 G. & S.W.R. tank locomotive to Whitelegg's design. This was completed to scale, with all working action and fittings, to sketches drawn in a few minutes from memory by a keen locomotive-modeller friend, Mr. A. Binning.

It was in the making of this model that I realised the great need of a lathe in model making. However, my advent into the hobby came at a time when lathes were next to impossible to obtain. Here, then, started some serious thinking, the decision to build a lathe being the outcome. That was that ; but how to begin was another matter !

First of all, I decided the lathe I should build would be a self-contained unit of average capacity, of such a size as to be readily used in the comfort of the home, fireside, actually, and yet be unobtrusive in the domestic affairs of the kitchen.

Regarding the construction, this I must confess was started with only the principle in mind, no detailed drawings other than a plywood layout being made.

As to the principle, I decided for ease of construction on a twin round bed—twin also for rigidity.



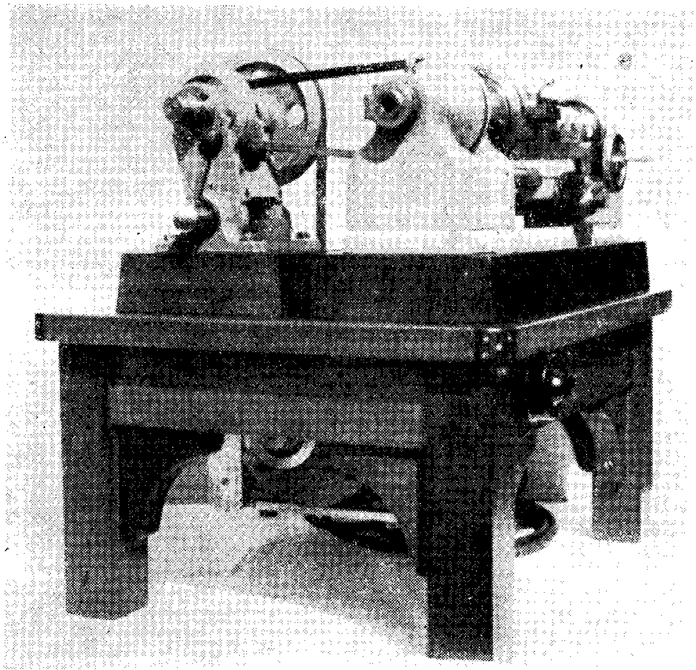
Tools mounted ready for use

Now for the actual construction. Having, as I have already mentioned, no detailed plan, I started on the ground floor, in effect a pattern in wood of the baseplate upon which the lathe was to rest.

One casting off this pattern in iron set me going on the first stage of my precision effort, that of bedding down the underside of the plate, preparatory to surface grinding.

Patterns for the head, saddle, tailstock and tailpiece followed, castings in good quality iron again being procured. Now for more bedding down with Prussian blue, this time, bases with both sides squared to them in each case, excepting, of course, the tailstock and saddle which, it will be readily understood, do not rest on the baseplate but are carried on the twin rods.

At this stage a hardened drilling jig, with all centres marked out, seemed to be indicated.


Showing the countershaft and locking arrangement

take Allen screws followed preparatory to sawing or slitting the lugs with bearings in position. Lapping-out the two $\frac{5}{8}$-in. bed holes to a push-fit completed the headstock.

The mandrel, which is hollow, being bored throughout $\frac{3}{8}$ in. clearance and taking No. 1 Morse, is made of hardened and ground steel. It is screwed $\frac{3}{4}$ in. $\times$ 12 threads on the nose. Two knurled lock-rings screwed with a fine left-hand thread completed this part of the assembly. The tailstock was the next item to have attention. beginning first with lapping out the bed holes. As in the case of the mandrel, the tailstock barrel is hollow, taking No. 1 Morse and having $\frac{3}{8}$ in. clearance through.

A cast-brass handwheel screwed $\frac{3}{4}$ in. square cut thread to fit the barrel is held in position by a split brass washer, Allen screws holding same to the tailstock.

The method of holding the barrel to the horizontal sliding

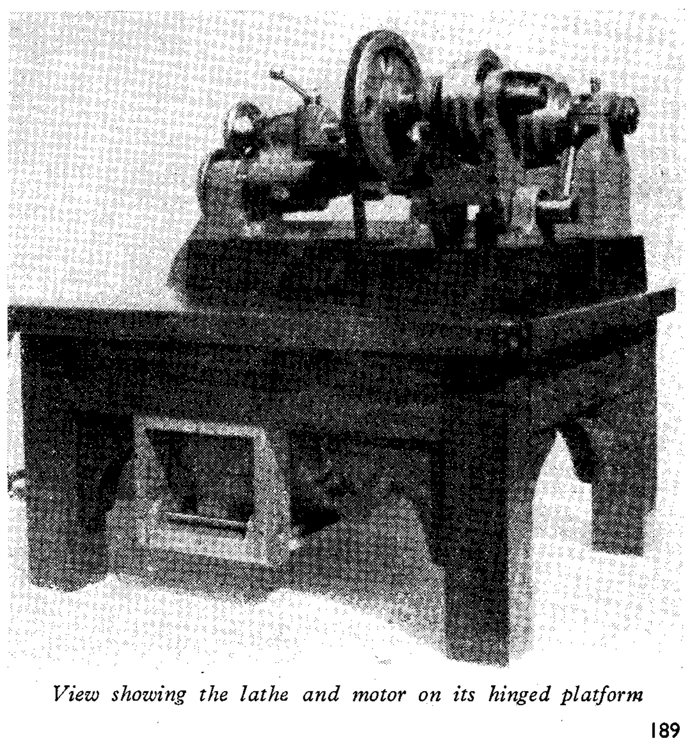
Before proceeding further I decided the next item must be a pattern and casting in hard brass for the saddle nut. This being made and fitted, I was now ready for drilling the castings, including the saddle with brass nut *in situ*.

The hardened jig, drilled 0.125 in. through centres, was then handed over with the castings to a friend who had access to machine tools.

He it was, during a whimsical talk on lathes, or rather the lack of them, who had urged me to go ahead, promising there and then to help out with any machining.

The bored-out castings, returned to me in due course, brought out this friend's keen interest in the job, the result being really "spot on."

Now followed some careful hand lapping. Beginning with the headstock, I lapped out the bearing holes until the phosphor-bronze bearings moved in with an easy push fit. Boring and spot-facing the bearing adjusting lugs to


View showing the lathe and motor on its hinged platform

position is commonplace and needs no description here.

Locking the tailstock in any position on the bed bars is quickly and evenly accomplished by the use of Allen screws on the split bed bar bosses.

Perhaps here I should mention the fact that full use has been made of Allen screws where possible, entailing only a tiny kit of spanners.

A brief mention of the method used in the making of the wheel patterns might also be of interest. This, although fairly well known but rarely used, that of sweeping up in plaster of paris, is particularly useful when only one or two castings are wanted or when it is desired, as in my case, to reduce turning to a minimum. Particularly, also, does this apply to an unusual form of wheel, as for example, the tailstock wheel.

Two more items, the end-piece and saddle, were then prepared for assembling.

The end-piece was tackled first. Although bored out with the other castings, it had yet to be lapped to fit the bed bars and have the phosphor-bronze bushes pressed in to take the leadscrew.

Now followed what was to me one of the most interesting parts of the venture, the actual assembling of the lathe proper. Here I had, quite by accident, a real thrill. It was whilst moving the tailstock to and fro along the bed bars to ease the close fit, I inadvertently pushed the tailstock barrel into the headstock bearings, which at that moment were temporarily unoccupied. There and then I decided no further checking for alignment was necessary, after seeing that barrel move so smoothly into the headstock bearings!

The cross-slide next had my attention. This, in cast-iron, machined and fitted very carefully, completed the actual lathe, other items such as four-way toolpost and handles being added bit by bit.

A nice wood plinth on which to mount the lathe seemed then to be indicated. That was the lathe, but then it had to be driven, so more scheming was indicated.

In the weeks that followed, my metal-working tools were put aside and I started thinking in terms of wood. The little table, a sturdy job as can be seen from the photographs, is built of mahogany, except the top, which is of $\frac{3}{4}$-in. plywood. This top was then covered with $\frac{1}{8}$-in. rubber linoleum which, it was thought, would facilitate cleaning off swarf or oil.

A countershaft in keeping with the lathe appeared then to be next in order. On showing a sketch of my then proposed countershaft to friend Binning, he immediately thought of something more suitable. The pleasing result of that something can be clearly seen from the photographs. This countershaft, fabricated throughout, is of mild-steel except, of course, the bearings, which are of phosphor-bronze and the pulleys of aluminium alloy.

The motor, a $\frac{1}{4}$ h.p. one which I had by me, is mounted under the table on a hinged platform.

As might be noted, the platform and hinge assembly has been constructed entirely of aluminium alloy, much use of which has been made where possible. Especially is this so of pulleys, which were made from my own plaster of paris patterns.

Transmission to countershaft and lathe is by $\frac{3}{8}$-in. V-rope.

The equipment, added gradually, now comprises faceplate, 3-in. Burnerd self-centring chuck, $3\frac{1}{4}$-in. Burnerd four-jaw independent chuck, $\frac{1}{4}$-in. capacity Jacob chuck, also tailstock die-holder.

In operation, the lathe has far exceeded my wildest thoughts of success, running as it does with that much sought after sweetness of movement. A piece of silver-steel in the first trial offered no difficulty whatever, even to the extent of parting-off without chatter. My little son, aged 10, can drill, face and part-off a piece of steel all unaided, involving as this does the operation of the four-way toolpost.

The lathe, now accepted as part of the kitchen equipment, required only a covering cabinet in cream and green to tone with the kitchen colour scheme. A tea-chest, purchased at the modest cost of 2s., provided the plywood for the construction of this final item.

Now, apart from being the proud possessor of a useful little tool, I cannot help but echo the lines from *The Village Blacksmith*, "Something attempted, something done . . ."

One Motor—Two Machines

(*Continued from page* 178)

on starting up (easing strain on motor and fuse), has the virtue (for the rule-of-thumb dilettante) of accommodating any slight misalignment of the coupled shafts.

The unwanted spare loose pulley provided with the machine was fitted in place of the big driver. That reduced the load and eliminated the nuisance of perpetual fuse-blowing.

In practice, I never open the coupling, but simply slip the belt off the saw when occupied at the lathe. The latter, of course, is disengaged when required by the usual lever on the bench unit. On occasions when I have had a companion worker, the one-third h.p. motor has proved adequate to handle both machines under load. The lathe is an old $3\frac{1}{2}$ in. Myford.

A CHUCK FOR THE LATHE GRINDER

by A. D. Stubbs

WHEN I made my lathe grinder (" M.E.," April 26th, 1951) I thought that I had finished the thing for good, but before long a small internal grinding job came along, and I could not purchase a sufficiently small carborundum wheel to go on my spindle.

To get over the difficulty, I purchased one of the standard 6 mm. arbored wheels, which are fixed on independent spindles. This was all right for the job in hand, provided that I could carry the 6 mm. spindle on the end of my grinder spindle, which called for a chuck, and Fig. 1 shows the result.

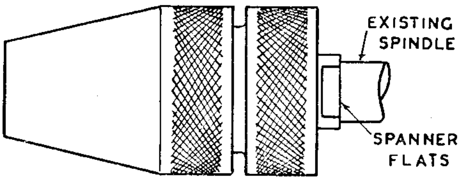


FIG. 1.

The only alteration to the grinder is the provision of two spanner flats on the shoulder. You probably have a cycle cone spanner, so the flats can be filed to suit, unless you prefer to mill them.

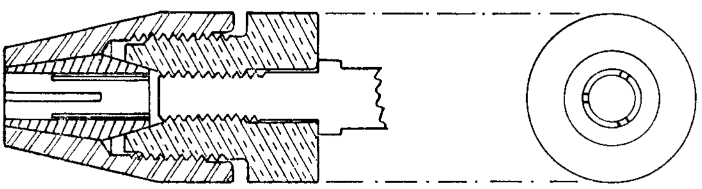


FIG. 2.

Before I acquired my lathe, all that sort of thing I did by hand, telling myself that it would be so nice to have a lathe. Now I look at the oiled lathe and tell myself that it will take longer to clean down and re-oil the lathe than it will to do the job by hand, so out comes a file, and once more to the vice, dear friends.

Anyhow, the chuck is a nice little job for the king of tools. Fig. 2 shows a full section of the tool, together with a front end view. The only special small tool which you may require is a drill or reamer for the hole in the collet, to take the 6 mm. arbor. I bored mine out, to a B drill size, as shown. The hole must be at least 6 mm. and preferably a little larger, and obviously, especially for high-speed grinding, the accuracy of the collet and its seatings must be beyond criticism.

The cap, Fig. 3, was made first, from mild-steel bar, although I should have preferred a little better material. With the bar held in a four-jaw independent chuck, I faced the threaded end, put through a pilot drill, followed by a $\frac{1}{4}$-in. and then a $\frac{1}{2}$-in. drill for the $\frac{5}{8}$ in. depth. The " bottom of thread " dimension was bored, also the top of thread clearance recess, followed by screwing to $\frac{5}{8}$ in. B.S.P.T., these operations giving me a clear run-in for the 8 deg. taper.

At this stage the cap came off the lathe, and I set up a piece of $\frac{1}{2}$-in. steel between centres, using the same 8 deg. setting to produce the left-hand end of the collet, Fig. 5, so ensuring that both were facsimiles.

Part of the body, Fig. 4, came next, the $\frac{1}{4}$ in. thread and clearance hole being machined to the lathe grinder spindle as a gauge, the $\frac{7}{8}$ in. end previously having been faced.

This enabled me to set up the lathe grinder spindle in a collet chuck and mount the partly-machined body thereon. The 15 deg. taper turning came next, and once more I broke down operations to taper-turn the other end of the collet.

One of these days I shall have to fix up a dial for taper turning. As it is, my method is slow, and cannot be guaranteed accurate to a given angle, so whenever possible I adopt the above method of getting there.

Back to the body, and this time all the remaining operations were completed, with the cap used as a gauge on the screwing. Once I could screw up the cap I machined its externals *in situ*, with the support of my live centre in the tailstock.

The collet was next parted, set up in the body and cap, and a pilot drill put through, with the assistance of my tailstock drill chuck. I never trust a drill in the tailstock, so upset the end of a piece of $\frac{1}{8}$-in. silver-steel, filed and ground this as an internal boring tool, hardened and tempered it, then held it in my Nulok boring bar. With $\frac{7}{8}$ in. extending from the holder, I very carefully enlarged the collet bore until the 6 mm. arbor could slide in nicely.

The spring on a long thin boring bar such as this, obviously calls for a slow feed and light cut. However, this method ensures that the hole is

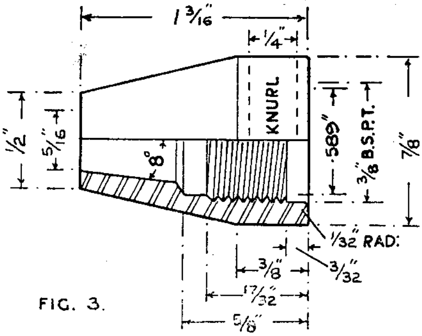


FIG. 3.

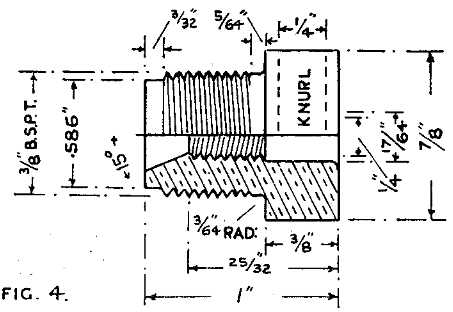


FIG. 4.

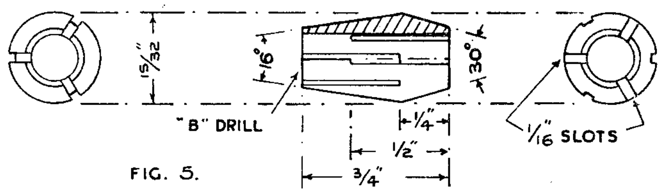


FIG. 5.

concentric with the body of the tool. If tool spring creates a slight taper in the hole this is of little consequence, being taken up by the coned collet in tightening.

All this gave me a chuck which was 100 per cent. true on its own spindle, but left me with the tricky job of slotting the collet.

My only tool for these slots was a slitting saw. In the half-sectional view of Fig. 5 you will see that I show square-ended slots. I did not drill-relieve the inner ends, because there is not a lot of metal left, and my ends are not square, being left on the saw radius. However, the drawing looks better that way, and the job could be done with a $\frac{1}{16}$-in. slotting drill if you prefer squared ends.

At 5,000 r.p.m. the tool is most useful, but is not nearly fast enough. This put me in a quandary, because to speed up my drive meant that I had either to fix up a countershaft or to put something like a farm cartwheel on the poor little motor.

However, difficulties are only created in order that they may be overcome, and a Heath Robinson countershaft was duly commissioned. A bicycle front hub bearing, purchased as a unit, did the job. The hub is clamped between two pieces of oak, the oak is secured to the side of my lathe bench, and two round leather belt drives step up the 1,440 r.p.m. motor by 3.5 : 1 and 3 : 1, the pulleys being turned out of sheet metal.

With six ball-races in action, one can hardly hear the carborundum wheel cutting, and the high-speed belt isn't particularly happy in its job, but I have no complaints against the grinder.

For the Bookshelf

Some Wallis & Steevens Traction Engines and Steam Wagons, by R. C. Wallis and J. P. Mullett. 32 pages, size 10 in. by 8 in. Price 4s. (by post, 4s. 3d.)

Traction-engine lovers will be indebted to the authors for this welcome addition to the all-too-small ranks of books on the subject, more especially because a number of blocks from which the illustrations are printed have been rescued actually from the scrap-heap, and would otherwise have been lost to us.

The book consists chiefly of large-sized illustrations, with an informative caption to each, dealing with the evolution of Wallis & Steevens' steam-driven road vehicles from their first traction-engine of 1877 to the last types of steam-tractor and steam-wagon.

There are four divisions : traction-engines, road locomotives, tractors, and wagons, each with a representative selection of photographs. These include tractions fitted with the Wallis expansion gear, showman's road locomotives, the oil-bath tractor, and the three-ton wagon, among many more. All the illustrations, by the way, appear to be " official " photographs.

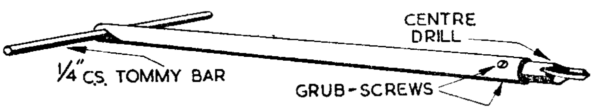
Printed on good quality paper, the book is published by the authors, from whom it may be obtained, at " Westcroft," Northchurch Common, Berkhamsted, Herts. It can be recommended to all lovers of steam.—W.J.H.

PRACTICAL LETTERS

Centring Long Shafts

DEAR SIR,—This method of accurately centring even long shafts may interest readers.

A silver-steel bar is used which accurately runs in the headstock mandrel; locked in the mandrel, either by collet (or 4-jaw) it has a centring drill inserted and held with below-the-surface grub-screws. (So use $\frac{1}{8}$ in. centre drill.) The other end is similarly centred and cross-drilled for $\frac{1}{4}$ in. c.s. tommy bar.



At the tailstock end, a bell-mouthed centre is used. This, however, necessitates that this end of the rod being centred, is accurately faced: (*a*) by hand; (*b*) by the "millwright" method, of a square centre and a brass bar in the toolpost. With this shallow inaccurate centre, the fixed steady is positioned and the job faced. At the headstock, the job in the 4-jaw is centralised with a dial test indicator.

The job is now running true and awaits the centres being bored. This is done by putting the lathe into reverse and feeding the long tool in by hand or by leverage.

Note that the centre will be accurate, in spite of the back centre's foibles.

Yours faithfully,

Crowborough. J. C. DAVIS.

"Twin Sisters"

DEAR SIR,—I should like to make a few constructive criticisms with regard to the above article in the July 5th issue.

What is the purpose of the projection, looking like an inverted oil-box, on the underside of the big-end of the eccentric-rod? I have never seen such a fitting in full-size practice, and cannot see any possible use for it.

Why stainless-steel for crank-pins and eccentric-rod-pins? It seems to me a most unsuitable material. What is wrong with silver-steel? It would never go rusty in service, unless lubrication had been sadly neglected for a very long time! Again, why silver-solder the eccentric-rod pins as well as screwing them 2 B.A.? Far easier make a press fit of it, and to make doubly sure, slightly spread out at the back.

While I agree that the fixing of the return crank on the crank-pin must be positive, his method seems most laborious, and at the end, not particularly reliable! If using his method, studs should be used; where screws are used in plain holes, slop can develop; but personally I should rather have a plain taper-pin through the middle of the pin and crank, with a clamping-bolt below, the latter being very useful while arriving at the correct position of the crank.

Yours faithfully,

London, S.W.1. R. M. EVANS.

A Simple Swarf Tray

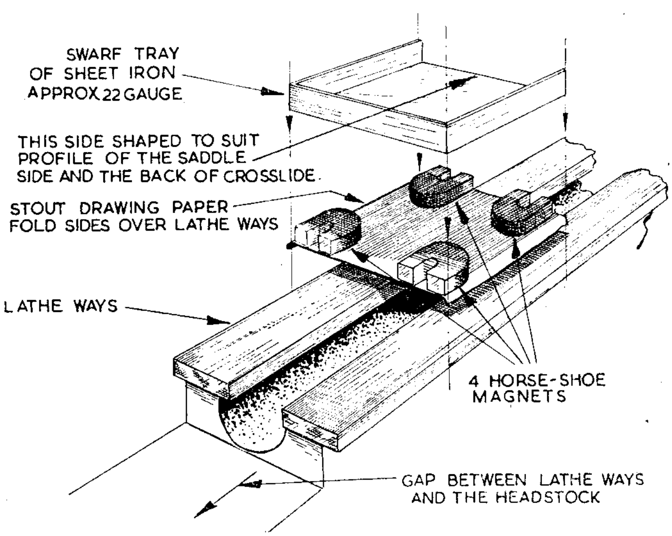
DEAR SIR,—After having taken delivery of a $3\frac{5}{8}$-in. Portass "New Look Model" and desirous of combating the swarf nuisance, the accompanying drawing shows how I overcame it.

Although a similar method was described in THE MODEL ENGINEER, August 3rd, 1950 (page 185), I could not make use of it because in my lathe, and there must be a large number of similar lathes in the country, there are no bolt slots. My idea consists of a paper layer with magnets between paper and swarf tray. Two sets were made one slightly larger than the other. The largest was for the lathe ways as described and the other for the cross-slide. The trays were of sheet-iron with three sides flanged. The side not flanged can be shaped to suit the profile of the saddle-side and the back of the cross-slide.

In practice two of the magnets in both cases make contact with the saddle side and the back of the cross-slide. The two sets cost only a few pence and once installed reduces the swarf nuisance to a minimum. Easy removal for cleaning out trays takes only a few seconds, and, when not required, can be laid in the chip tray where it will stay put—no frantic searching for that missing part on the shed floor.

Yours faithfully,

Erith. B. JESSUP.



Miniature Petrol Engines

DEAR SIR,—Congratulations to M. Hollick on the best-looking engine I have yet seen in THE MODEL ENGINEER! The attitude which he takes is highly commendable in these days, when appearance is the last factor to be considered, and an engine is looked upon as a horrible, but unavoidable adjunct to the various classes of speed-mania.

Mr. Hollick might like to know that it is quite common practice on large stationary diesel sets to use a radius-sectioned groove on valve stems.

I would like to suggest that if he ever gets tired of just watching the engine go round he might add to it, without spoiling its character, a small d.c. generator, and mount the whole on a deep hollow plinth which will conceal an ignition coil and condenser. The generator should supply the 6 or 8 watts necessary for the ignition circuit.

Incidentally, I do hope he will eventually locate some smaller piping for the oil-feeder!

Yours faithfully,

Bedford. W. S. LAYCOCK.

Screw Propellers

DEAR SIR,—As one whose main interest in model engineering lies in power boats, I think the article published in your issue of May 31st., on a propeller testing tank is extremely interesting, and if I might add, rather a pleasant change from the tendency which may please the majority of your readers, to concentrate so strongly on articles on the construction of machine tools and accessories and the use of them, as distinct from articles on the actual construction of models.

Would it be asking too much to suggest that if the North London Society of Model Engineers would publish some of the comparative results they have obtained, it would be most interesting and cut out quite a lot of guess work?

I had hoped that the notes on "Screw Propellers," published in the issue of June 28th, would solve some of these problems, but although I have read the article several times, I cannot quite see how the informatjon given can be applied in practice to model craft. At the end of the article it is stated that it is imperative that the size of the screw be worked out first, not the size or power of the propulsion unit. It is suggested that given a scale speed one should work out the pitch and diameter of the necessary screw, but no information is given as to the means of working out the resistance of forward motion of a model, on which apparently the diameter of the screw would be decided.

Furthermore, even with the correct calculation of diameter and pitch of a propeller to give a certain result, it is surely impossible to calculate what size engine would be required to drive the screw at the required number of revolutions. I do not see that we can get any further ahead by all this involved theoretical consideration of screw propellers so far as our models are concerned. I may be wrong, but I imagine that the average builder of say a model cargo boat, fits it with the largest and most efficient engine that can be accommodated without putting the hull below the low water line then proceeds to do some experimenting with propellers to get the best results. If I am wrong and these matters can be decided by theory, may I ask in all seriousness what would be the most efficient propeller to use on a model steam tug of average lines which I am building, which has a length of 68 in. overall, and to be driven by what size steam engine working at what pressure? I want my model to have maximum towing power, actual speed, as in the prototype, is of secondary consideration.

Finally, my enquiry is quite serious, I am not trying to decry the article in any way.

Yours faithfully,

Leicester. R. S. FARMER.

A Hair Drier

DEAR SIR,—Perhaps you will allow me a space to reply to Mr. Taylor's letter. No one could be more concerned than I am about the dangerous way many electrical appliances are used and, more particularly, that many are actually sold without adequate safeguards. It was for this reason that I drew attention to the possible dangers from indiscriminate wiring and mains connections.

Mr. Taylor's arguments seem to be a little confused for he says that the hair drier is worse than the motorised lawn mower. If his remarks had been confined to that machine then I should heartily agree with him, as only one break in a wire would suffice to make the whole apparatus become alive. In the case of the drier, however, for such to occur (1) the fault would have to occur, (2) the insulation would have to break down, and (3), believe it or not, the house wiring would have to be at fault!

I do not, as Mr. Taylor asks in his fourth paragraph, realise that "any circuit failure in the drier will leave part of it alive." It was to guard against such an event that I stressed the importance of providing an earth wire. His remarks about the brush are quite correct but then the three items mentioned above would have to occur simultaneously before the machine became dangerous. Later, Mr. Taylor attempts to draw some conclusion from his statement that the metal handle is "insulated for 24 V d.c. only." I would point out that the handle is not insulated at all: it is earthed!

Mr. Taylor's criticism is based mainly on the assumption that the "earth" of the house wiring may be at fault. On this basis his remarks would apply to any machine of reputable make. He recommends that it should be completely covered with insulating material. If we are to follow his advice, then the manufacturers of such things as vacuum cleaners, fires, irons, refrigerators, portable drills, individually-driven tools in factory and workshop (to mention only a few having metal cases), will have to amend their ways.

I would not like it thought that I decry safety precautions, but I do claim that to rely on the earth wire is accepted practice of reputable manufacturers.

I would like to end on a questioning note on a slightly different subject. Makers of repute often advise us not to use portable appliances in the bathroom; which is very sound advice. However, they seem to overlook the awful sins

we commit in the kitchen with irons, kettles, etc. I have an electric kettle supplied by G.E.C. with 5 ft. of flex. Now, my reach is 6 ft. and, in order that it should be impossible to touch both the kettle and the taps (ignoring for the moment the metal sink), the plug point must be outside a radius of 11 ft. from the taps. I should indeed have to have a mighty kitchen for this to be impossible. What am I supposed to do about it ?

There is a great deal in the subject of safety with electrical gear, perhaps even more than Mr. Taylor realises.

Yours faithfully,
Newport. J. STEBBINGS.

Rust Prevention

DEAR SIR,—Mr. Pitcher (5/7/51) is certainly right in his account of the conditions most conducive to rust in a workshop—relatively large masses of iron at a temperature below the dew-point of an incoming body of warmer air will always precipitate water in minute droplets. In doing this, the masses of iron gain heat from the air ; consequently small pieces of iron, that take only a small quantity of heat to raise their temperature to the dew-point, are less likely to precipitate water. As Mr. Pitcher points out, the upper surfaces show a greater tendency to rust than others, because these droplets, though so small that they fall only extremely slowly, do fall.

But that is not the whole story ; others have mentioned the value of covering susceptible surfaces. When air is cooled below its dew-point it will, if undisturbed and if in contact with only smooth surfaces, continue to hold more water than is theoretically possible, thus becoming super-saturated. If violently disturbed in this condition, as by an aircraft travelling through it at high speed, it immediately forms a dense cloud of particles of water—the vapour-trails that were so common a sight during the Battle of Britain. And even without disturbance these particles form most readily on solid nuclei, such as the exceedingly small solid particles of dust constantly present in any domestic atmosphere.

These dust particles that were, when dry, too small to fall at any appreciable speed, when coated with water become relatively large and heavy and so fall on to objects beneath them. This, I think, is the reason why covering iron objects undoubtedly prevents their rusting in some, but not in all, circumstances, and the nature of the covering matters not at all ; it need not be waterproof, but is better if light, dense and not dusty, while most cloth is water-absorbing, in that it will take up water actually falling on it, none is water-attracting (hygroscopic), and even if it were this could not cause rust except where the cloth touched the iron.

My own workshop is in the laundry of my house and so is frequently filled with hot saturated air. Against this I keep a small electric car-heater on my lathe-bed and another among my chucks, etc., because there is no cupboard in which I can shut them up, and I ask my household to switch them on before using the laundry. I also leave a coating of oil on all likely surfaces when I remember to do so, which (I confess with shame) is not always, and I keep my lathe covered and all my tools in closed cupboards. Using all these precautions, in spite of an extremely high probability of rust, I have no rust.

To avoid rust, keep all rustable objects in close-fitting cupboards that can be put into cupboards, and keep large iron objects for which you have not cupboard room smeared with thin oil and covered against dust. If you rely on artificial heat, see that the large iron things are heated first and are always at least as warm as the air around them.

Yours faithfully,
Edinburgh. G. STRUAN MARSHALL.

CLUB ANNOUNCEMENTS

Malden and District Society of Model Engineers

On August 26th, from 11 a.m., The South Eastern Association of Model Engineers locomotive gala day will be held at the Malden Society's track, Claygate Lane, Thames Ditton. Visitors welcomed. Refreshments available.

Hon. Secretary : G. C. SMITH, 101, Tudor Drive, Kingston, Surrey.

Sutton Coldfield and North Birmingham Model Engineering Society

Junior Section and Senior Workshop Night : The Warwickshire County Education Executive will be starting a Junior Model Engineering Class at Boldmere Secondary Modern School in September, and it is hoped that the boys will join the society. Ages will be from 15 to 18, and the course will be free. The workshop will also be open to senior members on Thursday evening at a cost of 7s. 6d. per annum. The workshop equipment includes two lathes, drillers, air-gas blowlamp and forge, vices, etc. Enrolment for the juniors will take place at the workshop on Monday, September 17th, and the seniors on Thursday, September 20th.

Exhibition : Our third exhibition will take place at the Church House on Thursday, Friday and Saturday, October 11th, 12th and 13th. This year we have booked the upper hall in addition to the main hall, and we intend devoting the upper hall to arts and crafts. In addition to our usual sections, we shall be running a special ladies' section. Entry forms will be issued later. Normal meetings will be held on August 14th, Open Night ; August 28th, Auction Sale ; September 11th, Brains Trust and September 25th, " Bits and Pieces Night," to which ladies are invited.

Hon. Secretary : C. F. PALMER, 77, Hartley Road, Kingstanding, Birmingham, 23.

Torbay Society of Model Engineers

The above society is holding a small exhibition at the Abbey Road Congregational Hall, Torquay, from September 3rd to 8th, 1951. We are limiting our exhibits to local ones only.

Hon. Secretary F. HUGH BEYRION, 107, Ilsham Road, Torquay.

The Tyneside Society of Model and Experimental Engineers

August 11th : " Use and Control of Gas." A lecture by Mr. R. Jones, A.M.I.Mech.E., of the Northern Gas Board, to be illustrated with photographs. Meeting at 2.45 p.m., in the Newcastle Photographic Society headquarters, 6, Rutherford Street, Newcastle.

October 1st-13th : Annual exhibition, to be held in the " Chronicle Hall," Newcastle-upon-Tyne, 2.30 to 9.30 p.m. weekdays, and 11.30 a.m. to 9.30 p.m. Saturdays. Proceeds in aid of *Evening Chronicle* " Sunshine Fund." Entry forms can be obtained from the secretary.

Hon. Secretary : L. JAMIESON, 34, Dorcas Avenue, Pendower, Newcastle-upon-Tyne.